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DNFSB RECOMMENDATION 94-1
HANFORD SITE INTEGRATED STABILIZATION MANAGEMENT PLAN

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) has developed an Integrated Program Plan (IPP) to address concerns identified in Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1. The IPP describes the actions that DOE plans to implement at its various sites to convert excess fissile materials to forms or conditions suitable for safe interim storage. The baseline IPP was issued as DOE's DNFSB Recommendation 94-1 Implementation Plan (IP), which was transmitted to the DNFSB on February 28, 1995. The IPP was subsequently supplemented with an Integrated Facilities Plan and a Research and Development Plan, which further develop complex-wide research and development and long-range facility requirements and plans. These additions to the baseline IPP were developed based on a systems engineering approach that integrated facilities and capabilities at the various DOE sites and focused on attaining safe interim storage with minimum safety risks and environmental impacts.

Each affected DOE site has developed a Site Integrated Stabilization Management Plan (SISMP) to identify individual site plans to implement the DNFSB Recommendation 94-1 IPP. The SISMPs were developed based on the objectives, requirements, and commitments identified in the DNFSB Recommendation 94-1 IP. The SISMPs supported formulation of the initial versions of the Integrated Facilities Plan and the Research and Development Plan. The SISMPs are periodically updated to reflect improved integration between DOE sites as identified during the IPP systems engineering evaluations.

This document constitutes the Hanford SISMP. This document includes the planned work scope, costs and schedules for activities at the Hanford Site to implement the DNFSB Recommendation 94-1 IPP.

Materials within the scope of this SISMP include spent nuclear fuel (SNF) and plutonium-bearing materials currently located at the Hanford Site. The Hanford SISMP is comprised of three volumes. Volume 1 identifies the plans for placing these materials in safe interim storage, and Volume 2 provides integrated schedules for completing the planned work scope identified in Volume 1. Volume 3 provides more detailed plans to address resolution of plutonium vulnerabilities.

The plans identified in the Hanford SISMP will result in removal of SNF from the 105-K Basins (K Basins) by July 2000, consistent with the DNFSB's recommendation *"that the program be accelerated to place the deteriorating reactor fuel in the K-East Basin at the Hanford Site in a stable configuration for interim storage until an option for ultimate disposition is chosen."* These plans will also result in removal of all sludge from the K Basins by August 2001 and will place Hanford Site plutonium-bearing materials in safe

interim storage by May 2002. The plans for fuel and sludge removal from the K Basins reflect a DNFSB Recommendation 94-1 IP change request submitted by the U.S. Department of Energy, Richland Operations Office (RL) in April 1997.

The remaining cost to achieve safe interim dry storage of the K Basins SNF is estimated at $468 million. This cost is based on current budget estimates and includes the costs to retrieve, package, cold vacuum dry, transport, stage, condition and implement dry interim storage (i.e., characterize SNF, acquire facilities, etc.) and disposition K Basins sludge. The additional cost to provide minimum safe operations at the K Basins until completion of fuel and sludge removal is estimated at $118 million. The total estimated cost to achieve safe interim storage and provide minimum safe operations for the K Basins SNF is $587 million. This total estimated cost is based on remaining costs for the activities from the beginning of fiscal year (FY) 1997 until completion and does not include costs associated with K Basins deactivation.

The remaining cost to achieve safe interim storage of the plutonium-bearing materials is estimated at $144 million. This plan assumes that DOE will reallocate resources to provide the budgets necessary to attain safe interim storage within schedule commitments.

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ALARA	As Low As Reasonably Achievable
ANL-W	Argonne National Laboratory-West
BWHC	B&W Hanford Company
BNFL	British Nuclear Fuels, Limited
BWR	Boiling Water Reactor
C/S	Containment and Surveillance
CCC	Core Component Container
CDR	Conceptual Design Requirements
CSB	Canister Storage Building
CVD	Cold Vacuum Drying
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy, Headquarters
DOT	Department of Transportation
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FDC	Functional Design Criteria
FFTF	Fast Flux Test Facility
FSAR	Final Safety Analysis Report
FY	Fiscal Year
GPP	General Plant Project
HCS	Hot Conditioning System
IAEA	International Atomic Energy Agency
INEEL	Idaho National Environmental and Engineering Laboratory
INEL	Idaho National Engineering Laboratory
IP	Implementation Plan
IPP	Integrated Program Plan
ISA	Interim Storage Area
ISC	Interim Storage Cask
IWT	Integrated Water Treatment
LAMPRE	Los Alamos Molten Plutonium Reactor Experiment
LANL	Los Alamos National Laboratory
LLBG	Low-Level Burial Ground
LOI	Loss On Ignition
LWR	Light Water Reactor
MCO	Multi-Canister Overpack
MOX	Mixed Oxides
MTU	Metric Tons Uranium
NDA	Non Destructive Analysis
NEPA	National Environmental Policy Act
NPH	Natural Phenomenon Hazards

NRC	U.S. Nuclear Regulatory Commission
NRF	Neutron Radiography Facility
OSU	Oregon State University
PFP	Plutonium Finishing Plant
PFPAL	Plutonium Finishing Plant Analytical Laboratory
PNNL	Pacific Northwest National Laboratory
PPSL	Plutonium Process Support Laboratory
PRF	Plutonium Reclamation Facility
PUREX	Plutonium-Uranium Extraction
PUSH	Plutonium Stabilization and Handling
PWR	Pressurized Water Reactor
RCRA	Resource Conservation and Recovery Act
RL	U.S. Department of Energy, Richland Operations Office
ROD	Record of Decision
RSB	Reactor Service Building
SAS	Safeguards and Security
SISMP	Site Integrated Stabilization Management Plan
SNF	Spent Nuclear Fuel
SPR	Single Pass Reactor
TRIGA	Training Reactor, Isotopes, General Atomics
TRU	Transuranic
TWRS	Tank Waste Remediation System
WHC	Westinghouse Hanford Company
WT%	Weight Percent
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 BACKGROUND

In May 1994, the Defense Nuclear Facilities Safety Board (DNFSB) issued DNFSB Recommendation 94-1 (Conway 1994), which identified concerns related to U.S. Department of Energy (DOE) management of legacy fissile materials remaining from past defense production activities. The DNFSB expressed concern about the existing storage conditions for these materials and the slow pace at which the conditions were being remediated. The DNFSB also expressed its belief that additional delays in stabilizing these fissile materials would be accompanied by further deterioration of safety and unnecessary increased risks to workers and the public.

In February 1995, DOE issued the *DNFSB Recommendation 94-1 Implementation Plan* (O'Leary 1995) to address the concerns identified in DNFSB Recommendation 94-1. The Implementation Plan (IP) identifies several DOE commitments to achieve safe interim storage for the legacy fissile materials, and constitutes DOE's baseline DNFSB Recommendation 94-1 Integrated Program Plan (IPP). The IPP describes the actions DOE plans to implement within the DOE complex to convert its excess fissile materials to forms or conditions suitable for safe interim storage. The IPP was subsequently supplemented with an Integrated Facilities Plan and a Research and Development Plan, which further develop complex-wide research and development and long-range facility requirements and plans. The additions to the baseline IPP were developed based on a systems engineering approach that integrated facilities and capabilities at the various DOE sites and focused on attaining safe interim storage with minimum safety risks and environmental impacts.

Each affected DOE site has developed a Site Integrated Stabilization Management Plan (SISMP) to identify individual site plans to implement the DNFSB Recommendation 94-1 IPP. The SISMPs were developed based on the objectives, requirements, and commitments identified in the DNFSB Recommendation 94-1 IP. The SISMPs also supported formulation of the initial versions of the Integrated Facilities Plan and the Research and Development Plan. The SISMPs are periodically updated to reflect improved integration between DOE sites as identified during the IPP systems engineering evaluations. This document is the fifth update of the Hanford SISMP.

The Hanford SISMP includes plans to address DNFSB Recommendation 94-1 concerns related to management of SNF and plutonium-bearing materials at the Hanford Site. The following Hanford Site-related concerns were identified in DNFSB Recommendation 94-1:

- *"The K-East Basin at the Hanford Site contains hundreds of tons of deteriorating irradiated nuclear fuel from the N Reactor. This fuel has been heavily corroded during its long period of storage under water, and the bottom of the basin is now covered by a thick deposit of sludge containing actinide compounds and fission products. The basin is near the Columbia River. It* *has leaked on several occasions, is likely to leak again, and has design and construction defects that make it seismically unsafe."*

- *"There are thousands of containers of plutonium-bearing liquids and solids at the Rocky Flats Plant, the Hanford Site, the Savannah River Site, and the Los Alamos National Laboratory. These materials were in the nuclear-weapons manufacturing pipeline when manufacturing ended. Large quantities of plutonium solutions are stored in deteriorating tanks, piping, and plastic bottles. Thousands of containers at the Rocky Flats Plant hold miscellaneous plutonium-bearing materials classed as "residuals", some of which are chemically unstable. Many of the containers of plutonium metal also contain plastic and, in some at the Rocky Flats Plant, the plastic is believed to be in intimate contact with the plutonium. It is well known that plutonium in contact with plastic can cause formation of hydrogen gas and pyrophoric plutonium compounds leading to a high probability of plutonium fires."*

The plans in the Hanford SISMP have been developed consistent with the DNFSB recommendations, including the following recommendations directly affecting the Hanford Site:

> *"That the program be accelerated to place the deteriorating reactor fuel in the K-East Basin at the Hanford Site in a stable configuration for interim storage until an option for ultimate disposition is chosen. This program needs to be directed toward storage methods that will minimize further deterioration."*
>
> *"That an integrated program plan be formulated on a high priority basis, to convert within 2-3 years the materials addressed in the specific recommendations below, to forms or conditions suitable for safe interim storage. This plan should recognize that remediation will require a systems engineering approach, involving integration of facilities and capabilities at a number of sites, and will require attention to limiting worker exposure and minimizing generation of additional waste and emission of effluents to the environment. The plan should include a provision that, within a reasonable period of time (such as eight years), all storage of plutonium metal and oxide should be in conformance with the draft DOE Standard on storage of plutonium now being made final."*

The schedule accelerations will result in removal of SNF and sludge from the 105 K East Basin (KE Basin) by July 2000 and August 2001, respectively, and will result in placement of plutonium-bearing materials at the Hanford Site Plutonium Finishing Plant (PFP) into safe interim storage by May 2002. The plans for fuel and sludge removal from the K Basins reflect a change request to the DNFSB Recommendation 94-1 IP submitted by RL to the U.S. Department of Energy - Headquarters (DOE-HQ) in April 1997 (Hansen 1997).

1.2 PURPOSE

This document comprises the Hanford SISMP. This document describes the DOE's plans at the Hanford Site to address concerns identified in DNFSB Recommendation 94-1. This document also identifies plans for other SNF inventories at the Hanford Site which are not within the scope of DNFSB Recommendation 94-1 because of their interrelationship with plans for SNF within the scope of DNFSB Recommendation 94-1. The SISMP was also developed to assist DOE in initial formulation of the Research and Development Plan and the Integrated Facilities Plan.

1.3 SCOPE

Materials within the scope of this SISMP include SNF and plutonium-bearing materials currently located at the Hanford Site as identified in DOE's DNFSB Recommendation 94-1 IP. The Hanford SISMP is comprised of three volumes. Volume 1 provides the plans for placing the SNF and plutonium-bearing materials into safe interim storage, and Volume 2 provides integrated schedules for completion of the planned work scope identified in Volume 1. Volume 3 provides more detailed plans to address resolution of plutonium vulnerabilities.

1.4 ORGANIZATIONAL RESPONSIBILITIES

Multiple organizations will support implementation of planned activities identified in this SISMP. DOE-HQ general organizational roles and responsibilities and interfaces with the DOE field offices for DNFSB 94-1-related activities are defined in the DNFSB 94-1.

The RL Spent Nuclear Fuels Project Division (SFD) has overall responsibility for establishing budgets, top level schedule commitments and requirements for the SNF Project. SFD is also responsible for managing the development of the Hanford SISMP and verifying performance to SNF related aspects of the SISMP schedule, cost, and technical baselines.

Fluor-Daniel Hanford, Incorporated (FDH) is the Project Hanford Management Contractor (PHMC). The FDH SNF Project is responsible for overall project direction, including establishment of technical cost, and schedule baselines and subcontracting their execution. The FDH SNF Project is also responsible for integrating development of the SISMP and providing contractor input on performance of SNF related schedule, cost, and technical baselines to the RL SFD. DE&S Hanford, Inc. (DESH) is contracted by FDH to implement the K Basins path forward. Specific responsibilities and authorities for management of Hanford Site SNF activities will be identified in HNF-SD-SNF-PMP-011, Hanford Site Spent Nuclear Fuel Project Management Plan.

The RL Transition Programs Division (TPD) has responsibility for management of PFP that is similar to SFD's responsibilities for SNF management. The TPD's PFP Transition

Program Office has overall responsibility for establishing budgets, top-level schedule commitments and criteria for management of PFP. The FDH PFP Project is responsible for overall project direction at PFP, including establishment of technical, schedule, and cost baselines and subcontracting their execution. B&W Hanford Company (BWHC) is contracted by FDH to execute the PFP stabilization activities. Responsibilities and standards of operation required in the performance of all work at PFP are identified in WHC-CM-5-8, *Plutonium Finishing Plant Administration, Volume 1.*

The responsible Hanford Site Recommendation 94-1 Program Managers are as follows:

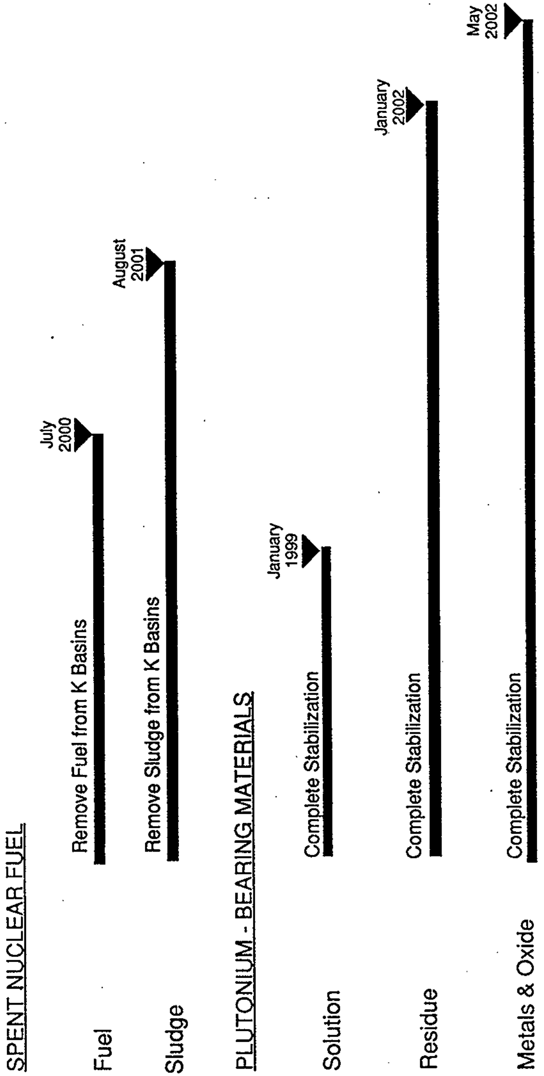
Spent Nuclear Fuel		
RL	O. M. Holgado	509-373-0589
FDH	E. W. Gerber	509-376-9356
DESH	R. L. McCormack	509-376-7057
Plutonium Bearing Materials		
RL	D. W. Templeton	509-373-2966
FDH	L. J. Olguin	509-372-8233
BWHC	T. E. Huber	509-373-1503

1.5 SUMMARY

The plans identified in the Hanford SISMP will result in removal of SNF from the K Basins by July 2000, consistent with the DNFSB's recommendation *"That the program be accelerated to place the deteriorating reactor fuel in the K-East Basin at the Hanford Site in a stable configuration for interim storage until an option for ultimate disposition is chosen."* Other plutonium-bearing materials at Hanford will be placed in safe interim storage by May 2002. A summary schedule for planned activities is provided in Figure 1-1.

The remaining cost to achieve safe interim dry storage of the K Basins SNF is estimated at $468 million. This cost is based on current budget estimates and includes the costs to retrieve, package, cold vacuum dry, transport, stage, condition and implement dry interim storage (i.e., characterize SNF, acquire facilities, etc.) and disposition K Basins sludge. The additional cost to provide minimum safe operations at the K Basins until completion of fuel and sludge removal is estimated at $118 million. The total estimated cost to achieve safe interim storage and provide minimum safe operations for the K Basins SNF is $587 million. This total estimated cost is based on remaining costs for the activities from the beginning of fiscal year (FY) 1997 until completion and does not include costs associated with K Basins deactivation.

Figure 1-1. Summary Schedule.



The remaining cost to achieve safe interim storage of the plutonium-bearing materials is estimated at $144 million. This plan assumes that DOE will reallocate resources to provide the budgets necessary to attain safe interim storage within schedule commitments.

The budget profiles are summarized in Table 1-1.

Table 1-1. Budget Profile. (Dollars in Millions)

	FY 1997	**FY 1998**	**FY 1999**	**FY 2000**	**FY 2001**	**FY 2002**
SNF Project Total*	186.1	151.4	119.8	100.5	28.9	
- Move the Fuel away from the River	80.2	97.2	79.2	60.3	14.2	
- Canister Storage Building	63.9	12.5	7.3	6.8	1.2	
- Fuel Conditioning Processes	16.7	15.7	6.6	6.0	0.6	
- Maintain Fuel in K Basins	25.3	26.0	26.7	27.4	12.9	
Plutonium-Bearing Materials	17.1	25.3	35.6	22.9	23.4	20.2

* Does not include disposition of other Hanford fuel.

2.0 HANFORD SITE SPENT NUCLEAR FUEL

The Hanford Site's Spent Nuclear Fuel (SNF) Project was formed in early 1994 to manage the Hanford Site's SNF and to address the urgent need to move the SNF in the K Basins from its present degraded storage conditions to safe interim storage. Additionally, the SNF Project was chartered to integrate management of all SNF within the Hanford Site, and to integrate Hanford Site SNF management with DOE complex-wide SNF management.

Activities conducted to manage Hanford Site SNF inventories are focused on remedying the DNFSB Recommendation 94-1 concern at the KE Basin and related concerns at the 105 K West (KW) Basin. Consistent with SNF Project objectives and the DNFSB Recommendation 94-1 IPP systems engineering approach, plans to place other Hanford Site SNF into safe interim storage are being integrated with the K Basin plans and with Hanford Site activities that manage other legacy materials. Additionally, all Hanford Site SNF inventories are included within the scope of DOE's National SNF Program, which is implementing plans for integrated management, including technology development, of all DOE-owned SNF.

Sections 2.1 and 2.2 of the Hanford SISMP identify DOE's plans for remedying near-term safety concerns and achieving safe interim storage of K Basins SNF and other Hanford Site SNF, respectively. Issues and plans common to all Hanford Site SNF are addressed in Sections 2.3 through 2.5. Current Hanford Site SNF storage locations are shown in Figure 2-1. The SNF inventories at each facility, and current management concerns, are identified in Table 2-1.

More comprehensive descriptions of the current fuel storage facilities and the fuel inventories are available in WHC-SD-SNF-TI-001, *Hanford Spent Fuel Inventory Baseline* (Bergsman 1994).

2.1 K BASINS SPENT NUCLEAR FUEL

2.1.1 Scope

The scope of this portion of the Hanford SISMP includes plans to remedy the urgent safety concerns at the K Basins and place the K Basins SNF into safe interim storage. The KE and KW Basins store approximately 2,100 metric tons of uranium (MTU) of defense (or "materials") production reactor SNF, primarily N Reactor SNF. The K Basins inventory includes defense production reactor SNF which was transferred from the PUREX Plant to the KW Basin in October 1995. The inventory also assumes a small quantity of defense production reactor SNF (i.e., <0.5 MTU) could also be transferred from the N Reactor Basins in 1997 during deactivation of that facility. Transfer of the PUREX Plant and N Reactor Basins SNF inventories to the K Basins is discussed in Section 2.2.

Figure 2-1. Location of Hanford Spent Nuclear Fuels.

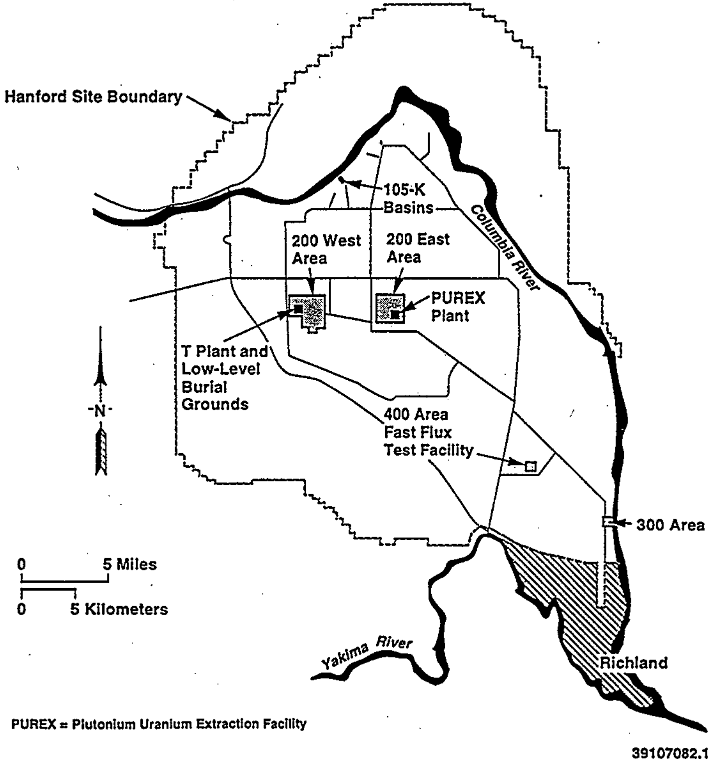


Table 2-1. Hanford Spent Nuclear Fuel Inventories.

Material Group	Storage Location	Quantity (Metric Tons of Heavy Metal)	Material/Packaging Concerns
Materials Production Fuels - N Reactor - Single-Pass Reactor	KE Basin	 1145.7 0.4	Seriously deteriorated storage conditions; lack of containment; corroding fuel; seismic vulnerability; aging facility.
Materials Production Fuels - N Reactor - Single-Pass Reactor	KW Basin	 954.1 3.0	Deteriorating storage conditions; corroding fuel; seismic vulnerability; aging facility.
Research Reactor Fuel - Fast Flux Test Facility	Fast Flux Test Facility	11.0	No significant material concern; facility deactivation requires alternate storage.
Materials Production Fuels	PUREX Plant	N/A	Material transferred to KW Basin on 10/12/95.
Special Case - Shippingport	T Plant	15.8	Aging facility; inefficient wet storage; facility mission necessitates alternate storage.
Miscellaneous Special Case and Research Reactor Fuels	324, 325, 327 Buildings	2.3	Dispersible material clean-up and facility vulnerability corrective actions necessitate alternate fuel storage; safety authorization not to current standards.
Specialty Fuels - TRIGA Fuel	400 Area.Interim Storage Area	0.02	Transferred to 400 Area from 308 Building in 12/95 to support facility deactivation.
Specialty Fuels - LAMPRE Fuel - Univ. of Washington Fuel	Plutonium Finishing Plant	 0.008 8.4×10^{-5}	LAMPRE fuel repackaging may be required for interim storage.
Specialty Fuels - TRIGA Fuel	Low-Level Burial Grounds	0.02	Material managed in solid waste management system consistent with LLBG management requirements. Retrieval in parallel with solid waste retrieval planned to minimize personnel exposure/risks.
TOTAL	Hanford Site	2,132	

2.1.2 Remediation Objective

The objectives of the plans in this SISMP, in regard to management of K Basins SNF inventories, are:

1. Resolve the safety and environmental concerns associated with the deteriorating SNF in the K Basins, including those identified in DNFSB Recommendation 94-1 and in the November 1993 document, *DOE Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and other Reactor Irradiated Nuclear Materials and the Environmental, Safety, and Health Vulnerabilities* (DOE 1993); and

2. Attain safe, environmentally sound, and economic dry interim storage of the K Basins SNF.

Safe dry interim storage for the K Basins SNF will be attained when the SNF is stored in a manner that satisfies dry interim storage requirements for DOE-owned SNF as defined in the Office of Spent Fuel Management's Functions and Requirements Document (DOE 1994b) and that achieves nuclear safety equivalent to comparable U.S. Nuclear Regulatory Commission (NRC) licensed facilities.

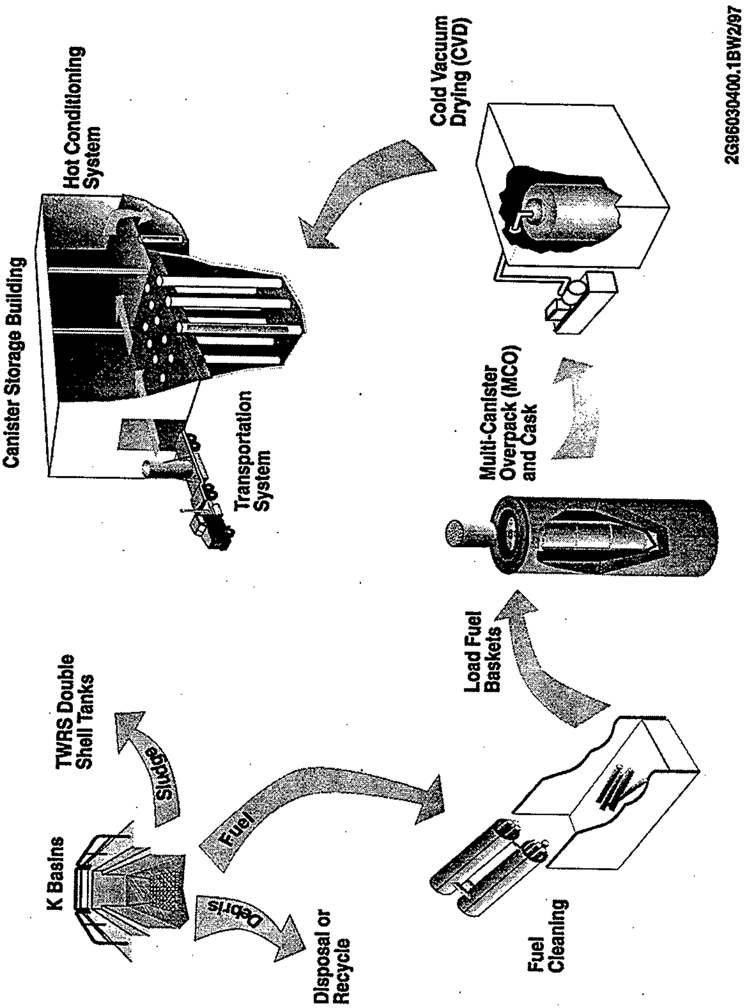
2.1.3 Remediation Process

Fuel removal from the K Basins and implementation of safe dry interim storage will be achieved consistent with the general approach identified in the October 1994 report, WHC-EP-0830 (Fulton 1994), as refined by the integrated process strategy for K Basins SNF approved by RL in July 1995 (DOE 1995a). Sludge will be dispositioned consistent with the RL approved K Basins sludge disposition strategy (DOE 1995b), contingent on regulatory approval and ability to meet Tank Waste Remediation System (TWRS) acceptance criteria. The fuel and sludge removal process is depicted in Figure 2-2. Near-term safety and environmental concerns at the K Basins will be addressed in parallel with long-term actions to achieve dry interim storage.

The primary steps of the remediation process are as follows:

- The K Basins SNF will be retrieved from current storage locations in existing canisters, cleaned to remove fuel corrosion products, placed in baskets, transferred in baskets to Multi-Canister Overpacks (MCOs), and vacuum dried at low temperature to remove free water. The cold vacuum dried SNF, contained in MCOs, will be shipped to the 200 East Area for staging in the Canister Storage Building (CSB), which was originally designed and construction initiated for storage of vitrified high-level waste from the Hanford Waste Vitrification Plant. Following a staging period of up to several months, the SNF contained in the MCOs will then be dried further at a higher

Figure 2-2. Fuel Removal Process.



temperature to remove bound water and returned to the CSB vault for interim storage. The initial cold vacuum drying step will satisfy requirements for SNF removal from the K Basins, consistent with the July 2000 commitment. The step to dry the fuel at the higher temperature is intended to improve the safety conditions for the MCOs during the interim storage period, and will be performed in the Hot Conditioning System (HCS) annex to the CSB.

- The K Basins sludge, in addition to fuel corrosion products generated during fuel cleaning, will be accumulated at the K Basins and later retrieved, characterized, and transferred to the 200 Area tank farms for disposition with tank farm waste, contingent on regulatory approval and TWRS acceptance. The sludge material will be managed as SNF while at K Basins.

These steps will result in dry storage of the fuel in a passive system that is configured to arrest further fuel corrosion. The CSB will be designed and constructed to modern design standards that results in nuclear safety equivalent to comparable NRC licensed fuel storage facilities for a 40-year storage period.

To ensure successful completion of the remediation process within schedule commitments identified in the IPP, DOE implemented the following project management strategy:

- Establish a dedicated DOE project office for executing the K Basins SNF path forward and maximize delegation of authority to the project office;
- Expedite project authorizations, including consolidation of key decisions;
- Establish a focused regulatory team and independent review team to streamline the process for establishing a safety authorization basis for the new storage system and achieving safety equivalent to comparable NRC-licensed facilities. The safety equivalence will be accomplished by applying technical requirements based on those applied by the NRC to comparable licensed facilities and by adopting appropriate features of the NRC licensing process, in addition to applicable DOE Orders and requirements.

As a result of the technical issues which emerged, the initial IPP schedule commitments are being revised as reflected in the April 1997 DNFSB Recommendation 94-1 change request. Additional actions being taken to minimize the potential for further schedule delays, are as follows:

- The PHMC and subcontractor fees are now tied 100 percent to performance agreements. For the Hanford SNF Project, these performance agreements were developed to ensure safe, timely completion of activities for fuel and sludge removal from the K Basins.

- Independent technical baseline validation was performed to identify technical, safety, documentation, and regulatory issues which represented vulnerabilities to successful and timely project execution and completion. An action plan was developed to address issues identified during the technical validation. Key findings of this validation effort and the significant actions identified are reflected in the modified SNF Project technical and schedule baseline to ensure successful project completion. The new schedule baseline was upgraded to include additional logic ties to ensure adequate definition and control of the critical path schedule for fuel and sludge removal from the K Basins. Additionally, project change control is being reinforced as the mechanism to ensure adequate management of the new technical, cost, and schedule baselines.

- All SNF Project design, safety, construction, and operational activities are continuously being reviewed and modified to reflect commercial practices where appropriate and beneficial. This selective application is intended to streamline work practices and focus resources on critical activities necessary to achieve results that will lead to project success.

- Increased senior and middle management focus on operational readiness activities has been initiated. This increased focus includes management training, management self assessment, and long-range planning to ensure that aggressive readiness schedules can be supported.

Activities within the preparation and production phases of the remediation process are described in the following sections. Activity descriptions are presented consistent with the schedules provided in Volume 2 of the SISMP for cross-reference. Activities which satisfy a DNFSB Recommendation 94-1 IP commitment are identified with the corresponding Nuclear Material Stabilization Task Group (NMSTG) milestone number. The NMSTG milestones are summarized in Section 2.1.4, Schedule Objectives.

2.1.3.1 Preparation. During the preparation period, the safety and environmental protection posture of the K Basins will be improved and systems will be acquired and readied to enable SNF and sludge removal.

As an initial activity within the preparation phase, the *Environmental Impact Statement for Management of SNF from the K Basins at the Hanford Site, Richland, Washington* (K Basins EIS) was prepared and the record of decision (ROD) issued to satisfy National Environmental Policy Act (NEPA) review requirements for SNF and sludge removal from the K Basins. Actions identified in this SISMP are consistent with the K Basins EIS ROD. The K Basins EIS Notice of Intent was published in the Federal Register in March 1995 to fulfill requirements of milestone IP-3.6-015. The K Basins EIS ROD was issued in March 1996 to fulfill the requirements of milestone IP-3.6-010.

Additional key activities within the preparation phase that have been completed include:

- Seismic isolation barriers (e.g., cofferdams) were installed between the KE Basin and the discharge chute to isolate the basin from the suspected leak site located in the unreinforced construction joint in the discharge chute. This action was completed to minimize the potential for environmental release of radioactive contaminants either directly through the leak into the ground or by airborne release, should the basin be drained as a consequence of a seismic event and the exposed sludge dry out to a powder form.

  Similarly, seismic isolation barriers were installed at the KW Basin to reduce environmental and safety risks, although the consequences of leakage should be less than at the KE Basin due to fuel and sludge containment and water quality at the KW Basin. Physical installation and successful completion of acceptance testing of the seismic isolation barriers fulfilled the requirements of milestones IP-3.6-016 and IP-3.6-017.

- An acquisition strategy and funding options were developed as an initial step in implementing the November 1994 approved path forward for fuel removal from the K Basins. This activity fulfilled the requirements for completion of milestone IP-3.6-014.

- An integrated project schedule was issued, which reflected the acquisition strategy. The schedule fulfilled the requirements of milestone IP-3.6-020. Subsequent schedule refinements were completed to reflect the integrated process strategy and to reduce project schedule risks.

- Fuel characterization was initiated in the 300 Area hot cells to fulfill the requirements of milestone IP-3.6-018. Subsequently, SNF and sludge characterization data were acquired from the hot cell evaluations, KE and KW Basins fuel element lift and look campaigns, additional fuel and sludge sampling and analysis campaigns, and gas/liquid sampling. These data have been provided to various subprojects to support system designs, safety authorization basis development, and permitting activities.

- As an initial step in assessing sludge retrieval and to support cofferdam installation, sludge was transferred from the discharge chute in the KE Basin during the cofferdam installation. Completion of this activity fulfilled the requirements of milestone IP-3.6-019.

- Activities were performed to reduce personnel exposure during current and planned operations, maintenance and construction activities in keeping with as-low-as-reasonably-achievable (ALARA) practices. Dose reduction is being and will continue to be achieved from reduction of the radioactive source term from the cesium-contaminated concrete basin walls and pipe runs in the

K Basins, developing and executing a dose management plan, and incorporating dose reduction features into designs. Significant dose reduction was achieved from cleaning and coating of the KE Basin wall "bathtub ring" and then raising the water level.

- A Formal Conduct of Operations program was established to improve safety of on-going operations.

- K Basins essential systems design was reconstituted to improve safety performance for activities conducted at the K Basins and to satisfy DOE Order 4700.1 requirements. The design reconstitution included development of K Basins essential drawings and systems descriptions.

- Several essential facility systems recovery actions were performed to support continued safe operations and personnel protection, including electrical systems upgrades and roof repairs.

- The Hanford SNF Project technical baseline was developed and documented in the SNF Project Technical Baseline Description document using a formal systems engineering approach.

The major remaining activities during the preparation phase are as follows:

- Project Direction - Project planning and control, including development and maintenance of cost and schedule baselines for the SNF Project, are being conducted to ensure effective resource management. The current baseline schedule is reflected in Volume 2. The schedules will continue to be refined, as necessary, to support successful project execution.

- Safety and Quality - Quality Assurance and regulatory compliance management and oversite are being provided for all SNF Project activities. Fuel and sludge characterization is being conducted to acquire data necessary to implement their removal from the K Basins.

  The K Basins SNF characterization is providing data on fuel oxidation, extent of fuel corrosion, reaction rates, fuel whole element drying, and ignition temperatures that collectively will enable process design, establishment of safety bases, and operation of fuel retrieval, CVD, HCS, CSB, and transport systems. The K Basins sludge characterization is providing data required for fuel cleaning, sludge particulate characteristics, sludge drying and disposition, including data required to complete waste profile data sheets for sludge acceptance by TWRS. The characterization activities are being conducted in five campaigns, as follows, to satisfy IP schedule commitments: acquire KW fuel; acquire KE Basin floor/pit sludge; acquire KE Basin fuel and canister sludge; acquire KW fuel and canister sludge; and acquire KW floor/pit sludge.

- Project Integration - Various activities are being performed to integrate the multiple subprojects to achieve safe interim storage of the K Basins SNF. The project technical baseline is being maintained through the construction and startup of the systems and facilities by a systems engineering activity. K Basins SNF process flow diagrams are being developed and maintained.

  Technology acquisition for the various subprojects is being integrated. The technology acquisition activities are described in Section 2.1.8.

- Operations - Maintenance and operations are being conducted at the K Basins to ensure safe storage until completion of SNF and sludge removal and turnover of the facilities for deactivation. The K Basins Formal Conduct of Operations program is being maintained to ensure adequate safety performance during execution of activities at the K Basins.

  Readiness activities are being conducted as necessary to ensure compliance with DOE Order 425.1 and DOE-STD-3006-95 for the various project systems supporting fuel removal from the K Basins. The readiness process is focusing on the physical systems, personnel, and the administrative process to support and maintain safe operations. When the readiness process is completed and readiness is verified, written authorization to proceed with system operations will be provided by DOE to plant management. The draft *Plan of Action for SNF Project Fuel Handling and Process Operations Operational Readiness Review* defines operational readiness and management self assessment activities to execute facility startup. The plan of action addresses the startup approval authority, graded approach, breadth of readiness review, core objectives, operational readiness pre-requisites, Operational Readiness Review schedules, and other elements necessary to formalize the plan.

- Facility Projects - Improvements are being completed to ensure K Basins facilities are adequate for continued safe operations and personnel protection during routine operations and activities to remove SNF and sludge from the K Basins. Additional facility and systems upgrades are being completed to support fuel, sludge, and debris removal from the K Basins.

  Essential facility systems recovery actions are being completed for electrical, potable water, fire protection, and maintenance systems. Supplemental facilities are being provided for maintenance and basin loadout personnel. Activities continue to be performed to reduce personnel exposure during current and planned operations, maintenance and construction activities in keeping with as-low-as-reasonably-achievable (ALARA) practices.

The Fuel Retrieval System is being acquired and will be readied for operations in the K Basins to retrieve SNF from existing storage, remove the SNF from existing canisters, remove fuel corrosion particulate from the SNF to the extent necessary to satisfy dry storage and transport requirements, and place the SNF into baskets for transfer into MCOs. Major activities include detailed design, fuel retrieval system testing, system procurement, and installation.

An Integrated Water Treatment (IWT) system is being acquired to improve water cleanup at the KE and KW Basins. The IWT system will include separate systems at each basin, with different designs to accommodate differences in sludge and fuel corrosion particulate sources. The IWT system will provide "clean" water for in-basin operations to ensure visibility during fuel retrieval operations, reduce worker dose during K Basins operations, and to reduce carryover of contamination to the MCOs and downstream facilities. The IWT system activity includes design, permitting, procurement, and installation of the systems at each basin.

Systems are being acquired and readied for operations at the K Basins to remove sludge and fuel corrosion particulate from the K Basins, consistent with the K Basins sludge path forward. The fuel corrosion particulate that will be addressed is comprised of the fuel corrosion products within the fuel canisters that are separated from the fuel during fuel cleaning to reduce the amount of free and bound water within an MCO. The sludge on the K Basins floors is believed to consist of blow sand, structural material oxides, and concrete spallation products. The sludge path forward is being integrated with K Basins debris removal, water treatment, and fuel retrieval due to the interrelationship of the activities.

The debris is comprised of various materials, such as unused canisters and discarded tools. Canisters accumulated at the KE Basin are currently being washed and transferred to a private contractor for compaction and subsequent transfer to solid waste disposal. Canisters emptied during fuel retrieval will be similarly dispositioned.

- SNF Storage - The SNF Storage activity includes MCO and Cask/Transport System acquisitions. The MCOs are being acquired to provide confinement/containment of the K Basins SNF during onsite transport, cold vacuum drying, staging, hot conditioning, and interim storage. The activity includes design, testing, and procurement of the 400 MCOs needed to repackage the entire SNF inventory at the K Basins. Fabrication and testing of prototype MCOs, baskets, and components was completed to support the MCO design. A Topical Safety Report is being developed to support the safety basis for MCO related operations and functions.

The Cask/Transport system is being acquired to enable onsite shipment of MCOs from the 100 Area to the CSB. The activity includes: modifications at the K Basins for cask handling; procurement of five casks, transport vehicles, cask handling and operations equipment, and MCO loading equipment; and issuance of a Safety Analysis Report for Packaging for onsite shipment of the casks. The Cask/Transport System design is now complete as is fabrication of the first two transport casks.

- Canister Storage Building - The CSB is being acquired to provide a location for safe interim storage of the K Basins SNF until final disposition. The CSB acquisition activities are being phased to support the aggressive construction schedule. The major phases of the CSB include acquisition of the CSB substructure, the deck, and the superstructure. The activity also includes acquisition of the MCO Handling Machine (MHM) and other CSB supporting equipment/systems. Concrete placement has been completed for the CSB vault structure and CSB load-in/load-out pits.

- Conditioning Projects - Fuel conditioning includes acquisition of the CVD system to support SNF removal from K Basins and the HCS to improve the safety posture for interim storage of the SNF by removing bound water. The HCS is being acquired in parallel with activities to remove SNF from the K Basins, but will not be available during initial SNF removal operations. Concrete placement has been initiated for the HCS annex to the CSB.

  The CVD system is being located within the 100-K Area, west of the KW Basin. The CVD system will include four stations for cold vacuum drying of the SNF within MCOs. Cold vacuum drying will be performed at 50°C to remove free water from the MCOs for onsite transport to and staging at the CSB. The temperature will then be elevated to 75°C to satisfy safety authorization basis requirements to verify acceptable conditions inside each MCO prior to onsite transport of the loaded MCOs. Design has been completed for the CVD Facility and process systems.

2.1.3.2 Production. Fuel removal will be initiated in May 1998 and completed in July 2000. The production phase for fuel removal will include operational activities to retrieve, package, cold vacuum dry, and transport the SNF and emplace the SNF into the CSB. The fuel removal phase does not include hot conditioning of the SNF. Initial fuel removal will be performed at the KW Basin to optimize production activities in an environment with low radiological exposure prior to full scale production in both basins. Initiation of fuel retrieval operations at the KW Basin will fulfill the requirements of IP-3.6-012. Removal of all SNF in canisters from the K Basins will fulfill the requirements of IP-3.6-001.

Sludge and fuel corrosion product removal from the K Basins, except KW Basin floor sludge that is not transferred to TWRS for disposition, will be completed by August 2001. These materials will be accumulated at the respective basins during fuel retrieval operations and later transferred to a transport package. Samples will then be acquired and analyzed. Assuming TWRS acceptance criteria are satisfied, these materials will be transported to TWRS facilities at the 200 Area and later vitrified. Approximately 50-70 cubic meters of sludge and fuel corrosion particulate will be removed from the K Basins. Completion of the sludge removal campaign will fulfill the requirements of milestone IP-3.6-201.

For hot conditioning, a loaded MCO will be removed from a storage tube and transferred to a hot conditioning station located in the HCS annex to the CSB. The SNF will be conditioned at an elevated temperature within the MCO to remove bound water. The MCO will then be returned to a storage tube within the CSB vault.

2.1.4 Schedule Objectives

Schedule objectives have been established for near-term actions to improve the safety posture at the K Basins in addition to actions to remove fuel and sludge from the K Basins. These objectives are reflected in the IP, as modified by the April 1997 change request.

The near-term schedule objectives, which were identified to remedy seismic concerns at the K Basins and to ensure early progress on the path forward for fuel removal from the K Basins, have been satisfied. These objectives include (NMSTG milestone numbers identified in parenthesis):

- Develop potential funding options and an acquisition strategy as appropriate by the end of March 1995 (IP-3.6-014).
- Issue Notice of Intent for K Basins EIS in March 1995 (IP-3.6-015).
- Complete cofferdam installation in K West Basin by February 1995 (IP-3.6-016) and in K East Basin by April 1995 (IP-3.6-017).
- Start fuel characterization in hot cells by April 1995 (IP-3.6-018).
- Initiate sludge retrieval demonstration in conjunction with cofferdam installation by April 1995 (IP-3.6-019).
- Issue a K Basins integrated schedule by May 1995 (IP-3.6-020) that includes the following:
    - Complete NEPA process;
    - Submit project validation package;
    - Initiate development for N Reactor fuel conditioning process;
    - Finalize site identification and initiate site characterization for facilities;
    - Place contract(s) for necessary equipment and facilities;
    - Begin fuel removal from K Basins;
    - Design MCOs;

  - Begin MCO manufacture;
  - Start and complete construction of CSB;
  - Start and complete construction of conditioning facility;
  - Start and complete fuel conditioning;
  - K Basin fuel in dry storage.

- Issuance of the K Basins EIS Record of Decision by December 1995 (IP-3.6-010).

The schedule objective for relocating K Basins SNF to safe, compliant storage is July 2000 or earlier (IP-3.6-001). Additionally, SNF removal from the K Basins will be initiated by May 1998 (IP-36-012), and sludge removal will be completed by August 2001 (IP-36-201).

Most activities identified in the previous revision of the SISMP as proposed supplemental schedule commitments have been completed. These activities were not included in the April 1997 DNFSB Recommendation 94-1 IP change request as schedule commitments, as previously proposed.

2.1.5 Assumptions

The scope, schedule, and costs identified in the Hanford SISMP for K Basins SNF plans are based on several key assumptions:

- The technical scope and approach to implement the path forward for fuel removal from the K Basins will be consistent with the general technical approach identified in the integrated process strategy.

- KE Basin sludge and fuel corrosion products will be dispositioned by vitrification at TWRS and will be stored with minimal pretreatment within existing TWRS double-shelled tanks prior to vitrification.

- Process throughputs and cycle times as defined in the current baseline are accurate and consistent with scheduled start and completion dates for fuel and sludge removal.

- Enabling assumptions used for safety analysis of current designs are successfully closed with no significant impacts.

- Office of Civilian Radioactive Waste Management requirements for disposal of Hanford SNF at the National Repository will not impact process, systems, or fuel conditioning end point criteria as those requirements become finalized.

- Budget and manpower resources will be available in support of critical path activities.

- Current onsite transportation requirements will not change.
- Resource Conservation and Recovery Act (RCRA) permitting and NRC licensing (or NRC review) will not be required for new storage or conditioning systems required to implement the path forward for fuel removal from K Basins.
- Current safeguards and security requirements identified in DOE Order 5333.2 will not change.

2.1.6 Issues and Problems

Critical issues that must be resolved to identify or implement actions at the Hanford Site and items that could limit schedule performance for K Basins SNF include:

- While removal of basin sludge is no longer on the critical path for SNF retrieval, the ability of the sludge to meet TWRS acceptance criteria must be demonstrated to satisfy schedule commitments for sludge removal.
- Design and safety analysis as well as the startup planning and Operational Readiness Reviews must be completed in parallel with final construction activities with no impact on planned startup dates.
- Adequate funding levels for Hanford Site SNF management must be maintained.

2.1.7 Alternatives

A formal systems engineering process is being used to establish and maintain a technical baseline for SNF management. The functions and requirements developed by the Hanford Site systems engineering process are based on site-specific requirements and high-level SNF management requirements established by the DOE Office of Spent Fuel Management. The Hanford SNF Project technical baseline and functions and requirements are identified in WHC 1995c.

The systems engineering process resulted in identification of the following alternatives for the K Basins fuel removal path forward:

Alternative 1: Alternative 1 overpacks the fuel stored in the KE Basin and maintains storage of overpacked fuel at KE Basin and encapsulated fuel at KW Basin until a fuel conditioning and interim storage system is available. For comparison purposes, the fuel conditioning process is assumed to be based on repackaging and passivation of the fuel once it is received in the Fuel Conditioning Facility. The repackaged/passivated fuel is then transferred to an interim storage facility that is assumed to be based on a vault storage concept. This alternative also includes upgrading the existing K Basins (retrofit and life extension).

Alternative 2: Alternative 2 overpacks the fuel stored in both K Basins and transfers the overpacked fuel to a wet pre-interim (an existing facility modified for wet storage), or to a new wet storage facility. The fuel is stored in this wet storage facility until a conditioning and interim storage system is available. For comparison purposes, the fuel conditioning process is assumed to be based on a fuel passivation concept proposed by a DOE independent technical assessment team. The process transfers the fuel from the overpacks selected for the pre-interim wet storage to the package configuration developed for the passivation system, within the pre-interim wet storage facility. The repackaged fuel is then transferred to the Fuel Conditioning Facility for passivation. The passivated fuel is then transferred to the dry interim storage facility that is based on a vault storage concept. In this alternative, the principal driver is the prompt removal of the SNF from the K Basins to another location for some period of pre-interim wet storage.

Alternative 3: Alternative 3 uses the passivation process identified in Alternative 2, without pre-interim wet storage. This alternative offers a possible method of early SNF conditioning with a potential for early achievement of interim dry storage. The SNF processing may be performed within a new addition to the K Basins or at a location associated with the dry interim storage facility.

Alternative 4: In this alternative, custody of the packaged SNF is transferred to a foreign enterprise that assumes responsibility for transoceanic transport and for processing to stable residues (conditioned wastes). In the preferred configuration, the residues are returned to the Hanford Site for interim dry storage to await final disposition. Alternative 4 includes packaging N Reactor SNF, assumes shipping the fuel to the British Nuclear Fuel Laboratories' Sellafield Plant located in the United Kingdom, and assumes processing the fuel at the Sellafield Plant and return of the residues to the Hanford Site for interim dry storage. The low- and intermediate-level wastes would be retained in the United Kingdom. Primary options within this alternative include: (1) shipping of unencapsulated damaged fuel in a British Nuclear Fuel Laboratories' cask instead of containerization of damaged fuel prior to cask loading; and (2) retention of conditioned waste/residue in the United Kingdom instead of returning it to the Hanford Site for interim dry storage.

The K Basins path forward alternatives were evaluated using a multi-attribute decision process as described in the Westinghouse Hanford Company (WHC) report WHC-EP-0830 (Fulton 1994). The evaluation process included scoping analyses of cost, schedule, safety and regulatory drivers; normalization of key assumptions and the bases for comparison; independent assessments by outside experts; and the use of decision analysis techniques to assure a comprehensive, balanced treatment of the pros, cons and uncertainties associated with the various alternatives. An important aspect of this process was the identification of vulnerabilities, their potential impacts and how they might be mitigated. For example, the impacts on related issues such as disposal of the water and debris, worker exposure, minimizing the cost and risks of continued operations in the K Basins, etc., were considered in selecting the recommended path forward.

The evaluation process resulted in selection of the path forward identified in the Hanford Site SISMP, which combines the best attributes of the various alternatives to accelerate fuel removal from the K Basins. DOE formal approval of the path forward is documented in Lytle (1994). Subsequent assessments have resulted in refinements to plans defined in the path forward, as reflected in the work scope, costs and schedules identified in the SISMP. Notably, the integrated process strategy (WHC 1995b) was developed to define an integrated approach for fuel removal, transport, staging, conditioning, and dry storage of the K Basins SNF. Additionally, the potential environmental impacts of the above alternatives were evaluated in the K Basins EIS, which resulted in a ROD consistent with the plans identified in the SISMP.

Alternatives considered in the K Basins path forward decision process will not enable fuel removal from the KE Basin within 2-3 years, but will satisfy schedule commitments identified in the IPP. Actions to improve the safety posture at the basin, such as installation of seismic isolation barriers, will reduce the risk of continued storage beyond three years.

2.1.8 Technology Development

Technology is being acquired to support the various activities to achieve dry interim storage of the K Basins SNF. The acquired technology is generally used to support design decisions and development of safety authorization bases.

The technology acquisition activity has developed baseline recommendations which are incorporated into the integrated process strategy and subsequent activities. Position papers have been developed on chemical reactivity for interim use in analyses, pending publication of further K Basins specific data. A basic approach for engineered management of potential fuel pyrophoricity has been developed relying on control of air ingress to limit reactive phenomena. Radiologic decomposition has been modeled for various design options. Oxygen gettering has been studied, with design recommendations developed. General degradation of the fuel condition, described by effective surface area has been developed. Finally, hydrogen detonation modeling basics have been established.

Detailed models are being used in the analysis to predict the thermal and pressure response of the integrated system (MCO and cask or MCO and CSB) for operational and accident transients. Models for MCO internal convective, conductive and radiative heat transfer have been incorporated, as have been chemical reaction rate equations, hydrate and hydride decomposition equations, radiolysis equations and decay heat relationships. These models are extended to integrate with release modeling and dose modeling, for those accidents which have the potential for release of fission products.

Technology activities are now centering on conclusion of integration of existing information and assumptions of system behavior in modeling outputs. A rigorous framework for validation of modeling input parameters has been established and is nearing completion. Definition, to the extent possible with available primary data and technical/peer reviews, of key parameters and assumptions is being performed to support near-term safety analysis schedules. Normal and off-normal processing regimes are also being examined to ensure they are well within safety envelopes and expected processing parameters.

Technology acquisition activities are being integrated with development activities at other DOE complexes through the National SNF Program's Technology Integration Technical Working Group. The cost of technology acquisition for the K Basins SNF is included within Table 2-2. Schedule and cost risks for SNF removal from the K Basins resulting from technology acquisition activities have been significantly reduced through decisions to desludge, repackage, and cold vacuum dry the K Basins SNF prior to transport to the CSB.

2.2 SITE-WIDE HANFORD SPENT NUCLEAR FUEL

2.2.1 Scope

Plans to attain safe interim storage for Hanford Site SNF that is currently located at facilities other than the K Basins (i.e., "other SNF" or “site-wide SNF”) are included in the SISMP for information, due to the potential for utilizing common facilities with DNFSB Recommendation 94-1 materials at the Hanford Site and other DOE sites. The facilities where the other SNF inventories are currently located and the respective facility missions are as follows:

- The T Plant, which was originally built and operated to support recovery of plutonium from irradiated fuel for defense purposes. T Plant now serves as a beta-gamma decontamination facility and provides other solid waste management services in addition to storage of Shippingport Pressurized Water Reactor (PWR) Core 2 fuel.

- The Fast Flux Test Facility (FFTF), which provided testing capability for the U.S. fast breeder reactor program, notably irradiation and evaluation of different types of fuel assemblies and materials for fuel assembly construction. The FFTF also produced materials such as medical isotopes. The FFTF test mission recently ended and the facility is awaiting a decision on other potential missions, such as tritium and medical isotope production.

- The 400 Area Interim Storage Area, which is adjacent to the FFTF. The 400 Area ISA includes a concrete storage pad, fencing, and lighting for cask storage of SNF. Currently six Neutron Radiography Facility (NRF) Training Reactor, Isotopics, General Atomics [TRIGA] SNF casks and two Department of Transportation Specification 6M containers are stored in a vault at the 400

Area ISA. Additionally, cask storage of FFTF SNF at the 400 Area ISA pad has been initiated to support FFTF transition activities.

- The 325 Building Shielded Analytical Laboratory (and 325-A Radiochemical Facility), which support process demonstration and analytical chemistry requirements for a variety of DOE programs. Miscellaneous fuel materials from various test programs remain in storage at the facility.

- The 324 Building, which is a shielded chemical processing laboratory used for development of chemical processes from laboratory to pilot scale and for examination and mechanical testing of irradiated specimens. The 324 Building contains laboratory, support facilities, and office space. LWR SNF remaining from various DOE and commercial test programs remain in storage at the facility.

- The 327 Building, also known as the Post-Irradiation Testing Laboratory (PITL), which provides shielded, ventilated, and specially equipped laboratories for physical and metallurgical examination and testing of irradiated fuels, concentrated fission products, and structural materials. The long-term mission of the facility is not certain. Near-term activities at the 327 Building include characterization, including N Reactor fuel characterization. Other fuel materials, such as FFTF SNF, remain on storage at the facility.

- The PFP in the 200 West Area, which supported plutonium metal production for the defense program. PFP is described in Section 3.0. SNF at PFP is currently stored at the 2736-ZB storage vault and in a storage module in the yard area.

- The 200 Area Low-Level Burial Ground (LLBG), which supports management of solid waste materials at the Hanford Site. The SNF at the LLBG, which includes TRIGA SNF stored in specially designed drums, is being managed consistent with LLBG management requirements.

Legacy defense production reactor SNF (i.e., N Reactor and Single-Pass Reactor SNF) was previously stored at the Plutonium-Uranium Extraction (PUREX) Plant. The PUREX Plant SNF inventory was shipped to the KW Basin in October 1995 and will be managed consistent with the other K Basins SNF inventory.

Additionally, up to 0.5 metric tons heavy metal of N Reactor SNF may be remaining in the sludge at the floor of the N Basins. SNF recovered during N Basins deactivation will be transferred to the KW Basin for consolidated management with other N Reactor SNF.

The inventories and storage concerns associated with the other Hanford Site SNF inventories were identified previously in Table 2-1. A brief description of the facilities is provided in Appendix A.

2.2.2 Remediation Objective

The objectives of the plans in this SISMP for site-wide Hanford SNF inventories are to:

1) Complete interim actions to remove fuel from existing facilities to support current facility missions and corrective actions to vulnerabilities identified in the November 1993 document, *DOE Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and other Reactor Irradiated Nuclear Materials and the Environmental, Safety, and Health Vulnerabilities* (DOE 1993); and

2) Attain safe, environmentally sound, and economic interim storage of all Hanford Site SNF pending establishment of a national SNF strategy and criteria for final disposition of DOE-owned SNF.

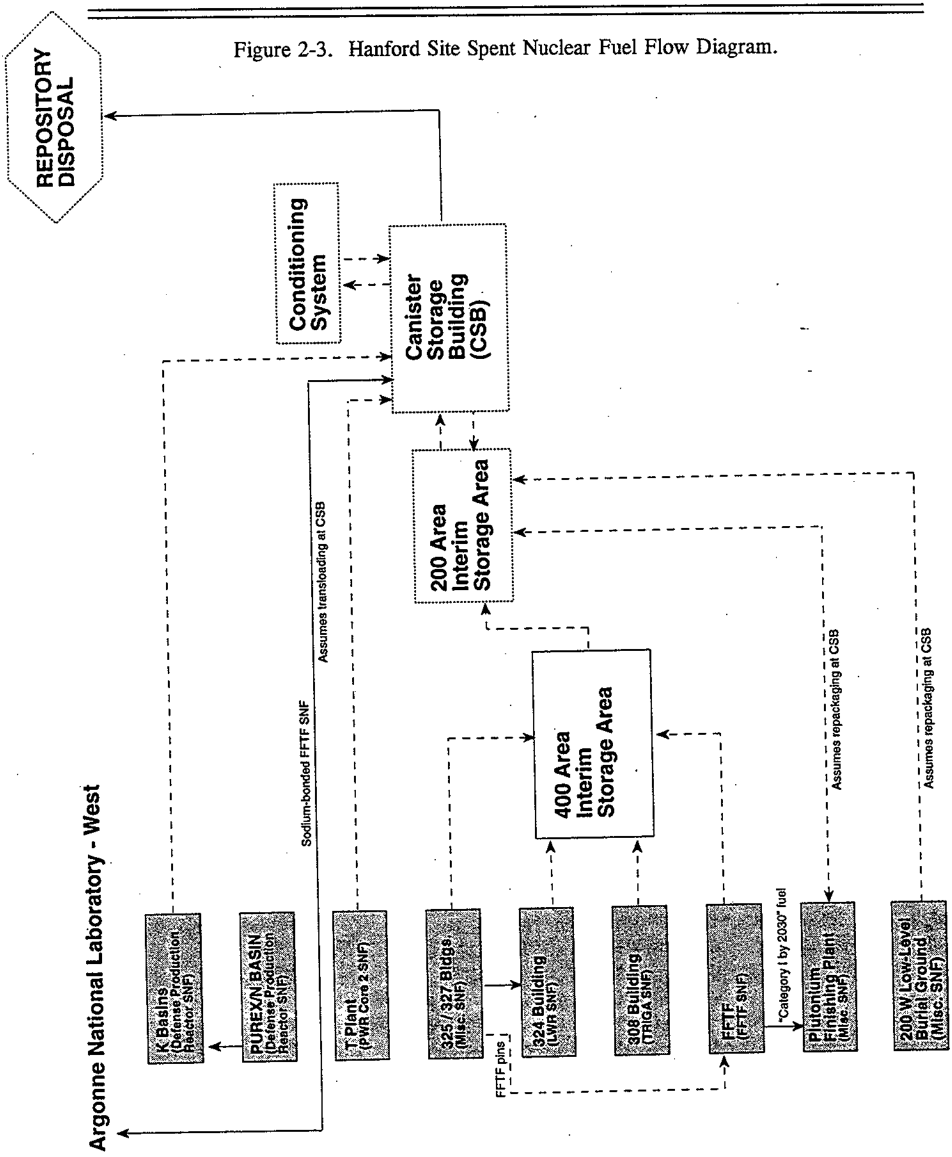
Interim actions will be performed and vulnerability corrective actions completed as identified in the October 1994 DOE document, *Plan of Action to Resolve Spent Nuclear Fuel Vulnerabilities (Phase III)* (DOE 1994a). Safe interim storage for the other Hanford Site SNF inventories will be attained when these materials are stored in a manner that satisfies dry interim storage requirements for DOE-owned SNF as defined in the Office of Spent Fuel Management's Functions and Requirements Document (DOE 1994b).

2.2.3 Remediation Process

The near-term management and interim storage activities will be integrated to minimize SNF handling and resultant exposure and waste generation. Actions to attain safe interim storage of site-wide Hanford SNF inventories are consistent with the settlement agreement (Idaho 1995) between the U.S. Department of the Navy., DOE, and the State of Idaho on the Record of Decision for the DOE Programmatic SNF Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement. The settlement agreement will result in continued storage of the site-wide Hanford SNF inventories at the Hanford Site until preparation for final disposition, except for sodium bonded FFTF SNF which will be transferred to Argonne National Laboratory-West (ANL-W) for treatment after December 2000.

Plans for management of the site-wide Hanford SNF are depicted in Figure 2-3. These actions include near-term consolidation of most SNF currently in the 300 and 400 Areas at the 400 Area ISA to support deactivation missions and vulnerability corrective actions at the FFTF and the 324/325/327 Buildings. After construction of the CSB, a 200 Area ISA will be installed adjacent to the CSB. The SNF at the 400 Area ISA and most 200 West Area SNF will be transferred to the 200 Area ISA or to the CSB to minimize storage costs and enable deactivation of 400 Area facilities. The CSB will be used to transload SNF for transfer off-site, as final disposition is implemented. SNF requiring enhanced safeguards and security will be stored at PFP.

Figure 2-3. Hanford Site Spent Nuclear Fuel Flow Diagram.



2.2.3.1 FFTF SNF. The FFTF SNF inventory will be removed from in-sodium storage at the FFTF to enable facility deactivation. The SNF will be transferred from FFTF to one of three near-term locations dependent on the SNF characteristics.

Most FFTF SNF will be washed in the FFTF Interim Examination and Maintenance (IEM) Cell to remove sodium. The assemblies will then be placed in unshielded Core Component Containers (CCCs) made from stainless steel and Inconel®. A bottom loading shielded fixture called the Solid Waste Cask will be used to remove each CCC from the IEM Cell and take the CCC to the adjacent Reactor Service Building (RSB), where each CCC will be inserted into an FFTF Interim Storage Cask (ISC) that has been previously loaded into the Cask Loading Station. A CCC is designed to hold six assemblies or pin containers. By removing the stainless steel end portion of an assembly, a seventh assembly will be added to each CCC, provided that the decay heat of the SNF placed in the CCC does not exceed 1,500 watts. Only six pin containers may be placed in a CCC. Approximately 50 ISCs will be required by implementing this approach. An ISC consists of a steel inner container bonded to concrete shielding using weld studs. The ISCs will function as secondary confinement. After each ISC is closed, the ISC will be inerted and moved to the adjacent 400 Area ISA. The 400 Area ISA pad is surrounded by a locked fence and lighting fixtures.

Sodium bonded FFTF SNF will be shipped to ANL-W in T-3 Casks for consolidation with similar SNF. The sodium bonded FFTF SNF will be initially stored in ISCs and later transloaded into T-3 Casks at the CSB. The DOE Certificate of Compliance for the T-3 Cask is being amended to accommodate full assemblies or an increased number of pins to curtail the number of shipments to ANL-W. The total number of SNF shipments will be eight, consisting of six assemblies and two pin containers.

Two or three ISCs will be placed inside the protected area at PFP to satisfy safeguards requirements. The ISCs will be shipped directly to PFP after loading and will not be stored at the 400 Area ISA.

The initial ISC was delivered in June 1995 and nine casks were loaded by August 1996. The last ISC is scheduled to be placed on the 400 Area ISA pad by Calendar Year 2000. The ISCs will be transferred from the 400 Area to the 200 Area ISA for storage until transfer off-site.

2.2.3.2 NRF TRIGA SNF. TRIGA® SNF previously stored at the 308 Building annex was loaded into six NRF TRIGA® Casks and transferred to the 400 Area ISA for storage in December 1995. TRIGA® Fuel Follower Control Rods were shipped at the same time and are being stored in two DOT 6M containers. The NRF TRIGA Casks and DOT 6M containers are stored in a vault module at the 400 Area ISA.

The NRF TRIGA Casks were designed with the intention of securing a DOE Certificate of Compliance (CoC) to enable shipment of the casks to INEL without repackaging. The DOT 6M casks are specification packages, and can be used for offsite shipment. The concrete vault will provide enhanced shielding during storage to meet the 400 Area ISA fence line maximum dose rate requirement of 0.5 mrem/hr.

The NRF TRIGA casks, DOT 6M containers and vault will be transferred to the 200 Area ISA, consistent with the FFTF SNF transfers.

2.2.3.3 324/325/327 Building SNF. The two BWR assemblies and five PWR assemblies and miscellaneous pins and pieces stored primarily in the 324 Radiochemical Engineering (RE) Cells will be encapsulated and transferred to dry storage casks. Encapsulation is required because the cladding on the fuel cannot be verified to be intact and will be contaminated with cesium and strontium from a melter experiment upset condition. LWR SNF pins and pieces from the 325 and 327 Building hot cells will be transferred to the 324 Building RE Cells for decontamination and inclusion in the encapsulation. The fuel will be transferred to storage casks in the RE Cells' Air Lock and shipped to the 400 Area ISA for storage.

Systems will be provided that enable both on-site shipping and storage of the LWR SNF. The current baseline entails shipment to the 400 Area ISA for storage and later relocation to the 200 Area ISA consistent with the FFTF SNF. Modification of the current baseline to ship the LWR SNF directly to the 200 Area ISA or CSB is being evaluated for overall cost and schedule improvements.

FFTF pins and pieces remaining at the 327 building will be returned to FFTF for disposition with the remainder of the FFTF SNF.

2.2.3.4 T Plant SNF. The 72 Shippingport PWR Core 2 assemblies stored at T Plant will be retrieved, placed into canisters similar to the K Basins SNF MCOs, dried, and transferred to the CSB for storage within the CSB vault.

2.2.3.5 PFP SNF. Three dissimilar fuel types are or will be stored at PFP: LAMPRE SNF, FFTF SNF, and University of Washington High-Enriched Uranium SNF. Because of physical differences, the storage systems for each of these SNF types will vary. The planning basis assumes that these SNF inventories will remain at PFP until transport for final disposition.

Currently, the LAMPRE SNF is packaged in three EBR-II casks, which have primarily been used as on-site transportation casks. The SNF was initially managed as Remote-Handled Transuranic material and has only recently been relocated to the protected area at PFP. The three casks are stored inside a concrete vault to provide an additional security barrier and supplement the casks' lead shielding. A review of the cask for continued dry storage will be completed. The LAMPRE SNF will be repackaged prior to transport off-site for final disposition. The repackaging would occur at the CSB.

A small amount of highly enriched uranium fuel from the University of Washington is stored in a 55-gallon drum inside the 2736-ZB Building, also located in the protected area. The planning basis for this material is to repackage the material at the same time as the LAMPRE SNF. The University of Washington material is not likely to continue to be classified as SNF, based on recent discussions with the Office of Spent Fuel Management. Therefore, the planning basis will likely be modified after formal reclassification is completed and the material dispositioned per requirements for highly enriched uranium.

The ISCs containing FFTF SNF designated for storage at PFP will be transported to an outdoor location inside PFP's protected area for storage on a precast concrete pad. This transfer is expected to take place by Calendar Year 2000.

2.2.3.6 Burial Ground SNF. The thirteen drums of Oregon State University (OSU) TRIGA® SNF are buried under four feet of soil in Trench 7 of the 218-W-4C Burial Facility of the 200 West Area LLBG in TRIGA® Standard Fuel Element Storage Drums. Each drum contains either six or seven TRIGA® elements for a total of 90.

The SNF Project planning basis for management of the OSU TRIGA® SNF at the LLBG entails receipt and repackaging of the SNF at the CSB into NRF TRIGA® Casks. The SNF would be exhumed simultaneous with solid waste retrieval. The casks will be staged at the 200 Area ISA until shipment off-site for final disposition.

2.2.4 Schedule Objectives

Schedule objectives to achieve safe interim storage of other Hanford Site SNF include removal of SNF from the following existing storage facilities to support the Hanford Site cleanup mission:

- **Fast Flux Test Facility.** Complete activities to offload FFTF fuel currently stored in sodium to dry storage casks by Calendar Year 2000.
- **324/325/327 Buildings.** Complete activities to package and transfer SNF from the 324/325/327 Buildings, including the 324 Building B Cell SNF, by September 1999.
- **T Plant.** Complete activities to remove SNF from T Plant by January 2001 to support the T Plant mission.

Additional schedules are identified in the October 1994 document, *Plan of Action to Resolve Spent Nuclear Fuel Vulnerabilities (Phase III)* (DOE 1994a).

2.2.5 Assumptions

The scope identified in the Hanford SISMP for other Hanford SNF inventories are based on several key assumptions:

- Budget and manpower resources will be available in support of critical path activities.
- Current onsite transportation requirements will not change.
- RCRA permitting and NRC licensing (or NRC review) will not be required for new storage systems for other Hanford Site SNF.
- Current safeguards and security requirements identified in DOE Order 5333.2 will not change.
- Interim storage will be implemented consistent with the DOE-Owned SNF Interim Storage Plan (DOE 1995d).

2.2.6 Issues and Problems

Critical issues that must be resolved to identify or implement actions at the Hanford Site, and items that could limit schedule performance, include the following:

- Onsite transportation requirements must be maintained to enable onsite transport of SNF within schedule objectives. Offsite transportation capabilities must be developed to implement shipments off-site.
- Adequate funding levels and funding stability for SNF management must be established.

2.2.7 Alternatives

A formal systems engineering process is being used to establish and maintain a technical baseline for SNF management as described in Section 2.1.7. The systems engineering process scope includes site-wide Hanford Site SNF inventories. Alternatives are evaluated, when needed, using the systems engineering process.

Alternatives to the baseline that have been considered for site-wide Hanford SNF include:

- Locating site-wide SNF on a common storage pad in the 200 Area or 400 Area;
- Utilizing the CSB for storage of site-wide SNF;

- Transfer of commercial LWR SNF off-site for leased storage at an NRC licensed commercial SNF storage facility.

- Repackaging and staging SNF storage within the current storage facilities until transfer off-site for final disposition.

Consistent with the Environmental Assessment for Management of Non-Defense Production Reactor SNF at the Hanford Site, Richland, Washington, the plan assumes staging of most current 300 and 400 Area SNF inventories at the 400 Area ISA and subsequent transfer to the 200 Area ISA for long-term interim storage. The SNF at T Plant will instead be stored within the CSB vault. To satisfy physical security requirements, the FFTF SNF which will be Category I prior to 2030 and the PFP SNF are planned for continued storage at PFP until transfer off-site for final disposition.

Potential alternatives, as they arise, will be evaluated based on requirements established in the Hanford Site SNF Project Technical Baseline. Current planned actions will be supported, modified, or alternative approaches implemented based on the results of the evaluation. Transport and storage logistics for potential off-site shipments will be considered in conjunction with the DOE-Owned Spent Nuclear Fuel Interim Storage Plan.

2.2.8 Technology Development

Technology development will be required to support ultimate disposition of other Hanford Site SNF. However, readily available commercial technologies are sufficient to achieve safe interim storage of most of this SNF. Technology development will be limited primarily to qualifying the defense production reactor SNF at the K Basins, as described in Section 2.1.8, for dry storage. Detailed technology development needs will be finalized through the systems engineering process. Technology development activities will be integrated with other DOE complex development activities through the National SNF Program's Technology Integration Technical Working Group and documented in the DOE Spent Nuclear Fuel Technology Integration Plan (DOE 1994b).

2.3 RESOURCES

Funding will be required to support expense-related activities and acquisition of four major systems related to the K Basins path forward. Actions to implement interim storage of other Hanford Site SNF inventories are not within the scope of DNFSB Recommendation 94-1 and, therefore, the associated costs are not identified in the SISMP.

Funding requirements to meet DNFSB Recommendation 94-1 IPP commitments for the K Basins SNF are shown in Table 2-2. The total project costs, including continued K Basins operations and maintenance, are also identified for reference purposes.

Table 2-2. Funding Requirements. (Cost in thousands of dollars.)

Program Element	**Fund Type**	**FY 1997**	**FY 1998**	**FY 1999**	**FY 2000**	**FY 2001**
Project Direction	Expense	1,900	6,854	13,000	12,000	6,500
Safety and Quality	Expense	9,937	6,228	263	270	50
	Capital	75				
Project Integration	Expense	13,189	13,938	13,169	9,689	6,892
Operations	Expense	9,082	26,339	23,182	28,540	475
Facility Projects	Expense	22,932	19,649	11,372	2,806	250
	Capital	11,443	9,072			
MCO	Expense	3,926	11,651	18,200	6,920	
Cask/Transport System	Expense	1,068	432			
	Capital	6,571	3,010			
Subtotal for Move the Fuel from the River	Expense	62,034	85,091	79,186	60,225	14,167
	Capital	18,089	12,082	0	0	0
	Total	80,123	97,173	79,186	60,225	14,167
Canister Storage Building	Expense	1,325	5,067	7,324	6,830	628
	Capital	62,573	7,473	0	0	0
	Total	63,898	12,540	7,324	6,830	628
Fuel Conditioning Process	Expense	964	6,222	6,581	6,028	628
	Capital	15,736	9,432	0	0	0
	Total	16,700	15,654	6,581	6,028	628
Maintain Fuel in K Basins	Expense	25,337	26,004	26,712	27,422	12,904
Total SNF Projects*	Expense	89,660	122,384	119,803	100,505	28,864
	Capital	96,398	28,987	0	0	0
	Total	186,058	151,371	119,803	100,505	28,864

* Does not include disposition of other Hanford fuel.

2.4 WORK PLAN

Cost and technical baselines for the activities defined in the Hanford SISMP will be monitored on a monthly basis, and variance reports will be submitted to RL by the SNF Project on the tenth working day of each month. The variance report will cover any variation between the baseline and actual schedule for DNFSB Recommendation 94-1 commitments or actions that affect those commitments. Explanation of the variance and plans for necessary corrective action will be provided. The technical baseline is subject to formal change control.

The baseline schedule is provided in Volume 2 of the SISMP.

2.5 STAKEHOLDER INVOLVEMENT

Hanford Site stakeholders have been and continue to be involved in decisions related to Hanford Site SNF management through various related venues, including:

- The Office of Spent Fuel Management's stakeholder involvement program, which deals primarily with higher-level SNF management policy issues;
- NEPA review public involvement activities, particularly those that support Hanford site-specific SNF management;
- The Hanford Site SNF Project's site-specific stakeholder involvement program, which has focused significantly on the K Basins path forward decision process.

The major Hanford Site stakeholders include: three major tribal governments (the Yakama Indian Nation, the Nez Perce Tribe, and the Confederated Tribes of the Umatilla Indian Reservation); the Hanford Advisory Board, which is primarily comprised of representatives from key Northwest public interest groups; and Hanford Site regulators, notably the State of Washington Department of Ecology and the U.S. Environmental Protection Agency. During the K Basins fuel removal path forward decision process, input was requested from several stakeholder organizations, including the three major tribal governments and the Hanford Advisory Board's Major Safety and Waste Management Issues Working Group. Stakeholder feedback on subsequent refinements to the path forward decision has been and will continue to be requested on a routine basis.

3.0 PLUTONIUM-BEARING MATERIALS

This portion of the Hanford SISMP discusses the stabilization, repackaging, and storage or disposal of remaining plutonium-bearing materials in inventory at the PFP from Hanford production and a variety of other sources, as well as those non-waste and plutonium-bearing materials arising from terminal cleanout of Hanford Site facilities.

The scope of actions in this portion responds to safety concerns identified in DNFSB Recommendation 94-1 and to specific corrective actions identified in the Plutonium Vulnerability Management Plan (DOE 1995c). The DNFSB was concerned in 1994 that significant quantities of plutonium remained in DOE inventories as unstable oxide and other chemical forms unsuited for long-term storage. The DOE 94-1 IP committed Hanford to stabilize Pu considered at urgent risk by May 1997 and all remaining at-risk materials by May 2002. To provide specific technical guidance to Pu facilities, DOE issued DOE-STD-3013-94, *"Criteria for Safe Storage of Plutonium Metals and Oxides"*, (3013), which addresses technical criteria for stabilization and packaging for long term storage of metals and oxides containing greater than 50 weight percent (wt%) Pu. That standard was updated and a revision issued in 1996 as DOE-STD-3013-96.

While PFP's inventory of plutonium-bearing materials awaits stabilization and repackaging, the DOE *"Criteria for Interim Storage of Plutonium-Bearing Solid Materials"* [Interim Storage Criteria (Curtis 1996)] provide guidance for the interim safe storage of plutonium-bearing solid materials for a period of five to twenty years. The Hanford SISMP lays out the strategy by which PFP will meet the requirements of the Recommendation 94-1 IP.

Processing enhancements and storage equipment modifications are necessary to complete the PFP stabilization program. The PFP Environmental Impact Statement (PFP EIS) documents the decision-making process for which stabilization methods will be used, and programmatically constrains separation of Pu from residues. Once the modifications described in the sections below are installed, PFP has the capability to stabilize and store, or dispose of as transuranic waste, all of the materials in the current PFP inventory, as well as those materials resulting from Hanford's terminal clean out operations in future.

Schedules and funding profiles are also included in this SISMP. A total of $144 million above routine facility surveillance and maintenance costs over 7 years is required to execute this plan.

Two site specific concerns have been identified:

- RCRA compliance and permitting constraints
- Integration of International Atomic Energy Agency (IAEA) safeguards with stabilization activities and long-term storage

3.1 INTRODUCTION

3.1.1 Scope

This portion of the Hanford SISMP encompasses Pu-bearing materials currently managed by BWHC at the Hanford Site, including certain items recently received from PNNL facilities (total 1.8 kg Pu) as well as three items (total 1.2 kg Pu) received from the Mound Plant. PNNL is currently preparing certain items (another 1.2 kg Pu) to meet the Hanford Waste Acceptance Criteria, for grouting and disposal by October 1997. Table 3-1 categorizes the PFP inventory, which totals approximately 4 metric tons (MT) net weight Pu, distributed among approximately 7,871 items. All of the Pu at PFP has been declared excess to national security needs. Approximately 1 MT of the inventory is currently under IAEA safeguards.

For stabilization considerations, Pu-bearing material at the PFP has been grouped into three broad categories:

- Solutions
- Residues (<50 wt% Pu)
- Metals and Oxides (>50 wt% Pu)

As shown in Table 3-1, the PFP inventory items constitute a wide range of chemical and physical forms: metals, pure (>85%) Pu oxides, high grade (50-85%) Pu oxides, Pu solutions, mixed Pu/U oxides (MOX), fuel pins and assemblies, process holdup, and other residues (sand, slag, and crucible, ash, polycubes, etc.) Table 3-1 lists inventory amounts of each category of Pu-bearing material.

Approximately 3 MT of Pu is scheduled to undergo stabilization and packaging in the SPS and/or the muffle furnaces, including the pure and high-grade oxides, stabilized solutions product, mixed Pu/U oxides and metals. Three main process paths have been planned for these materials as follows:

- Metals and oxides of greater than 50 wt% Pu will be stabilized and repackaged to 3013 criteria. A Stabilization and Packaging System (SPS) will be installed for thermal stabilization of oxides; stabilization of metals and oxides incompatible with the SPS will take place in PFP muffle furnaces followed by repackaging in the SPS.

- Solutions will undergo stabilization in a vertical denitration calciner. The calcined product will be a Pu oxide of greater than 50 wt% Pu to be repackaged in the SPS to 3013 criteria.

Table 3-1. PFP Inventory of Plutonium-Bearing Materials
as of May 31, 1996

Material Type	Number of Items	Weight Pu (kg)
Metals and Oxides addressed by DOE-STD-3013		
Metal	352	736
Oxides > 50 wt% Pu * (incl 1.2 kg from Mound)	2611	1879
Mixed Oxides < 50 wt% Pu	2297	323
Subtotal	5260	2938
Materials to be converted to meet DOE-STD-3013		
Solutions	436	326
Polycubes	260	34
Alloys	126	34
Sources	202	24
Subtotal	1024	418
Materials to be addressed by the Residue Policy, Trade Studies, & Interim Storage Criteria		
Oxide <50 wt% Pu	560	79
Ash	527	79
Slag and Crucible	266	43
Compounds	26	4
Process Holdup	N/A	72
Other/Miscellaneous	28	1
Other Combustibles	12	1
Subtotal	1419	279
Materials stored in exception to either standard		
Fuel Pin Assemblies	168	711
GRAND TOTAL	7871	4345

* Mound Pu added to table (1.2 kg). Inventory totals rounded to nearest kg.

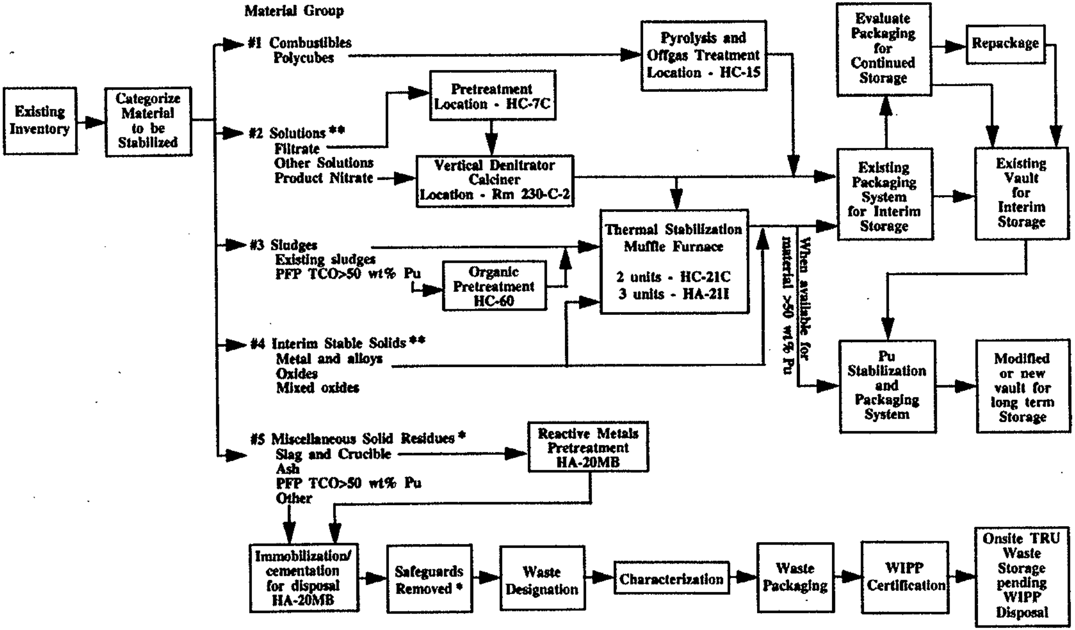
- Most residues and oxides of less than 50 wt% Pu or Pu/U will be pretreated as necessary, cemented, and sent to the Waste Isolation Pilot Plant (WIPP) for disposal. Polycubes (styrene solid forms containing Pu or Pu/U) will be stabilized in a two-stage pyrolysis furnace. The resulting oxides will be packaged in the SPS to 3013 criteria.

The PFP EIS Record of Decision (ROD) supports completion of the actions described in this SISMP. Figure 3-1 displays the stabilization and storage material flow for the DNFSB 94-1 baseline plan. Figure 3-2 illustrates the PFP building layout and the location of processing equipment. Tables 3-2 and 3-3 list the milestones identified for DOE to complete the commitments outlined in the DNFSB Recommendation 94-1 Implementation Plan. Initial discussions of potential impacts of IAEA safeguards requirements on processing and storage have taken place.

The preliminary stabilization and cleanup rates in the SISMP did not consider the relatively large radiation dose to workers, and there was initial uncertainty whether individual exposure could be held within the Hanford administrative limit of 1,500 mrem per year with all systems operational and at projected staff levels. A dose evaluation engineering study on the overall system was performed to address this issue. The study was completed in June 1996, and determined that adequate processing rates will be achievable while containing individual worker doses within the administrative limit.

Storage facility modifications to accommodate 3013-compliant storage packages are described in this portion of the Hanford SISMP. Continued storage of unirradiated Fast Flux Test Facility (FFTF) fuel assemblies is also addressed in this portion, but no actions are required. These assemblies are considered stable and suitable for 50-year storage as is.

Figure 3-1. Summary Material Flow for DNFSB 94-1 Baseline Plan



* Materials for which safeguards cannot be removed may be managed according to Group #1 or #3

** Additional evaluation of MOX compounds and solutions may determine that some of the leanest items should be discarded. Solids would go to WIPP and solutions would go to TWRS.

Figure 3-2 PFP Stabilization Processing Areas

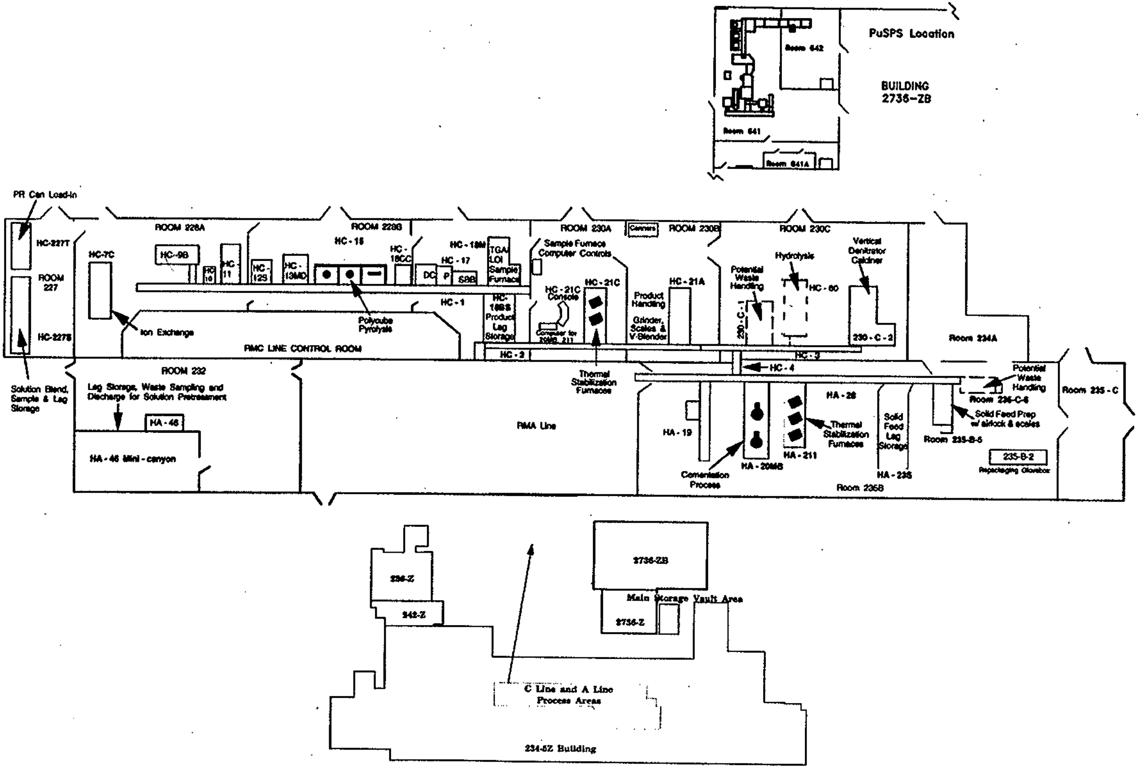


Table 3-2. Summary of Completed Milestones

Activity	Milestone Due Date	IP Number/Comments
Issue Material Characterization Plan	March 1995	Completed March 1995
Initiate and complete transfer of PUREX solutions to tank farms for disposal.	August 1995	IP-3.1-023 & IP-3.1-024 Completed April 1995.
Start engineering studies of a new repackaging line at Hanford	September 1995	IP-3.2-028 Completed September 1995.
Stabilize sludge residue inventory.	September 1995	IP-3.3-031 Completed June 1995.
Stabilize high-risk solutions	September 1995	IP-3.1-015 Completed September 1995.
Verify venting of solution containers	December 1995	IP-3.1-014 Completed May 1995.
Stabilize high-risk incinerator ash	March 1996	IP-3.3-032 Completed January 1996.
Complete solution technology development at PFP	March 1996	IP-3.1-021 Completed April 1996.
Feasibility of Calciner Modification	March 1996	Impacts decision: use of new vs. existing prototype Completed March 1996
Issue Dose Evaluation Study	June 1996	Impacts design of process systems Completed June 1996
PFP EIS-ROD	June 1996	IP-3.1-016 Completed June 1996

Table 3-3. Summary of Outstanding Milestones

Activity	Milestone Due Date	IP Number/Comments
Begin processing solutions at PFP	June 1997	IP-3.1-022
Complete detailed design, equipment procurement, and installation of a new repackaging system at Hanford	December 1998	IP-3.2-029
Complete stabilizing remaining solutions; 4,800 liters total inventory. Approximately 4,300 liters remain to be stabilized.	January 1999	IP-3.1-017
Start restabilizing high assay oxides at PFP	July 1999	IP-3.2.033
Begin stabilization of polycubes.	July 1999	IP-3.3-028
Train staff, prepare procedures, perform operational readiness testing (prior to commencing operations)	September 1999	IP-3.2-030
Commence repackaging operations at Hanford	October 1999	IP-3.2-031
Complete stabilize reactive solid residues; Sand, slag, & crucible, and poorly characterized items	January 2000	IP-3.3-026
Complete metal repackaging at Hanford.	September 2000	IP-3.2-032
Stabilization of polycubes complete	January 2001	IP-3.3-029
Stabilization and repackaging of interim-stabilized materials complete	January 2002	IP-3.3-027
Stabilize and repackage all remaining residues to safe storage standards	May 2002	IP-3.3-033
Thermally stabilize and repackage all Pu oxide to meet the metal and oxide storage standard [DOE-STD-3013-96]	May 2002	IP-3.2-018

3.2 SOLUTIONS

3.2.1 Scope

The scope of this portion of the Hanford SISMP is the initial inventory of Pu-bearing solutions at PFP. In 1995, the inventory at PFP contained approximately 4,804 liters of solution consisting of: 4,514 liters of nitrate solutions; 270 liters of chloride and miscellaneous solutions; and 20 liters of organic solutions. These solutions were in 10-liter containers in storage in the 234-5Z Building. The chloride and fluoride solutions were considered to be the greatest risk to container integrity based on their reactive nature and resulting container corrosion potential, and therefore received early attention. Stabilization of solutions during developmental and preproduction testing has reduced the solution inventory remaining in 10-liter containers to approximately 4,300 liters.

3.2.2 Remediation Objectives and End State

The objective is to transform the current inventory of solutions to a stable form suitable for 50-year storage. Where this path is not appropriate to the material form, the objective is to discard those solutions as TRU waste to Hanford 200 Area waste tanks. The product form for the stabilized solutions will be > 50 wt% Pu oxide, calcined to temperature criteria in 3013. The resulting oxide will be packaged in accordance with criteria in 3013.

Organic solutions (20 liters), and any other solutions that are not compatible with the planned processing capability without extensive pretreatment, will be immobilized and discarded as TRU waste. Alternately, the organic solutions may be compatible with stabilization in the pyrolysis furnace system as discussed in the residues section. This alternate path utilizing the pyrolysis furnace system for organic solutions stabilization will be evaluated in FY 1998.

3.2.2.1 Concept of Operations. Pu solutions at PFP consist of nitrate, flush, and filtrate stored in 10-liter containers awaiting transformation to oxide or transfer to the Hanford 200 Area Tank Farms. Transformation priority will be given to the nitrate solutions. The nitrate solution containers will be loaded into process staging tanks in Room 227, then vacuum transferred to the vertical denitration calciner glovebox to be stabilized into oxide and heated to 1000°C. The product oxide will then be removed and packaged in compliance with the Interim Storage Criteria until the SPS is available for repackaging into 3013 packages. The path to stabilization for the flush and filtrate solutions mirrors the nitrate solution path with an additional ion exchange pre-treatment step to raise the concentration of these dilute Pu solutions for effective operation of the calcination process. Waste solutions generated by the pretreatment process are transferred to Hanford waste tanks for disposal.

3.2.3 Remediation Process

Direct denitration oxidation using a continuous vertical calciner has been chosen at the stabilization method for solutions remaining at the PFP. Solutions will be transformed to Pu oxide in the calciner to meet 3013 criteria for stable form. Ion exchange will be used to pretreat relatively dilute solutions for effective calciner operation. Plutonium Process Support Laboratory (PPSL) staff have conducted pre-production testing of the ion exchange pretreatment process and proof tests of the prototype vertical calciner improvements.

All liquid waste generated from the solution stabilization process will be routed through existing systems and disposed to the Hanford 200 Area waste tanks in accordance with current site waste tank acceptance criteria. The expected volume of waste is minimal and can easily be accommodated by the Hanford waste tanks.

3.2.3.1 Preparation. The preparation phase for solution stabilization at PFP addresses near-term actions to mitigate risks identified with the continued storage of solutions in 10-liter containers. Inspection of the solutions stored in 10-liter containers was completed in May 1995. This ensures that all containers are properly vented to preclude the potential for pressurization caused by the generation of hydrogen gas. This inspection activity completed the actions necessary to fulfill the requirements of Milestone IP-3.1-014, "All bottles of plutonium solutions at Hanford inspected to ensure proper venting."

Another near-term risk mitigation activity conducted was the stabilization of roughly 270 liters of chloride and fluoride solutions. Precipitation of the Pu with magnesium oxide was followed by calcination at 1000°C in a muffle furnace. This action was part of the solution stabilization development program conducted in the PPSL. The resultant oxide material was packaged to comply with the Interim Storage Criteria, and will be repackaged to meet 3013 criteria when equipment is available. The stabilization, packaging, and storage of chloride and fluoride solutions completed the actions necessary to fulfill the requirement of Milestone "IP-3.1-015; 220 liters of chloride solutions at Hanford stabilized" in September 1995.

Direct denitration via vertical calciner was selected as the system to stabilize Pu solutions for purposes of schedule formulation. The outcome of the developmental test program was a decision report in April 1996 documenting the results of the testing. Completion of this developmental program and the issuance of the test report completed the requirements of Milestone "IP-3.1-021; Complete solution technology development at Hanford Plutonium Finishing Plant (PFP)."

The issuance of the PFP EIS ROD in June 1996 allows implementation of the stabilization processes identified in this SISMP. Issuance of the PFP ROD in June 1996 has fulfilled the requirement of Milestone "IP-3.1-016; ROD issued for PFP Clean-out and Stabilization EIS." Completion of these milestones was documented via letter to RL.

Addition of the vertical calciner system to PFP is being accomplished under Hanford Project C-226, Vertical Calciner. The Functional Design Criteria (FDC) and Conceptual Design Report (CDR), including detailed cost and schedule information for Project C-226, have been issued. Advanced conceptual design activities were completed in September 1996. Definitive design authorization has been provided by DOE and equipment installation is underway. The current project schedule indicates a potential three-month startup date variance with the solution stabilization startup milestone. The solution milestone completion date of January 1999 remains unchanged.

Safety analysis for Project C-226 will ensure safe operation and provide the proper safety documentation to comply with applicable DOE Orders. Compliance with the Orders will ensure the protection of the environment, employees and members of the general public are not subject to undue risk. Fabrication, procurement, and installation are proceeding concurrently. The development of procedures and operator training materials has also begun. Once procedures are developed and approved and equipment installed, operators will be trained and preproduction testing of the equipment will take place.

Readiness assessment scoping will be done by BWHC to establish the breadth and depth of the assessment. Prior to startup, a readiness assessment will be conducted by BWHC for the solution stabilization process in accordance with established readiness process procedures that ensure compliance with DOE Order 5480.31. This readiness process will focus on the adequacy of hardware, personnel, and the administrative process necessary to support and maintain the safe operation of the stabilization activity. After the readiness process is completed and readiness is verified, written authorization to proceed with the solution stabilization program work will be provided to BWHC by RL. Completion of the readiness process ends the preparation activities required prior to startup of the solution stabilization process. Completion of the readiness process also responds to DOE's policy that facilities will be started or restarted in accordance with DOE Order 5480.31.

3.2.3.2 Production. Startup of solution stabilization is scheduled to be initiated in September 1997. Startup fulfills the requirement of Milestone "IP-3.1-022; Begin processing solutions at PFP." Solutions will be processed through the vertical calciner with a projected throughput of 540 liters of feed per month. This figure is based on the assumptions identified in Section 3.2.5 below. At this throughput, the inventory of solutions is expected to be processed within ten months to transform the current inventory of solutions to a stable form.

Solution processing will be completed in June 1998, ahead of the milestone schedule. Completion of solution processing fulfills the requirement of Milestone "IP-3.1-017; Stabilization of 4,800 liters at PFP completed." Completion of these milestones will be documented via letter to RL.

3.2.4 Schedule Objectives

Schedule details for solution stabilization are shown in Volume 2, Appendix B of this SISMP. Highlights include:

- Developmental testing on the vertical calciner began in June 1995 and was completed in December 1996.

- Procurement and installation of the vertical calciner began upon project authorization. Initial startup of the new system is anticipated in September 1997 with the projected throughput of 540 liters of feed per month reached by December 1997.

- Stabilization of the solutions is projected to be completed in June 1998, well before the date required by the milestone.

- An Ion Exchange pretreatment system will be installed by December 1997 for use with dilute solutions.

3.2.5 Assumptions

The following assumptions were considered in the development of this portion of the Hanford SISMP:

1. PFP Vault fixtures currently accommodate a maximum of 2.5 kg Pu. Equipment modifications will be required to store the 5-kg packages discussed in 3013. An FY 1998 Line Item project will provide SPS equipment and vault modifications needed for packaging and storage of 3013 packages.

2. Stabilized high-assay (>50 wt% Pu) oxides produced by the calciner will be packaged to the Interim Storage Criteria, stored, then retrieved from storage when the SPS is available and repackaged into 3013 packages without additional stabilization.

3. Operations will be on a 24-hour-per-day, 5-day-per-week basis.

    - Throughput for the vertical calciner will be 540 liters per month following three months of system operation.

    - Startup of the ion exchange pretreatment process will lag the startup of the direct denitration vertical calciner to allow earlier startup of the solution stabilization process for solutions which do not require pretreatment.

3.2.6 Issues and Problems

The following issues and problems have been identified which could affect the ability of the solution stabilization program to meet its objectives:

1. The disposal of selected low-assay Pu solutions may be delayed by the need to obtain disposal authority for those items designated as waste. Alternative treatment options are described in Section 3.2.7, item 2.

2. The vertical calciner is not a suitable process to stabilize organic solutions. Alternative methods are described in Section 3.2.7, item 2.

3.2.7 Alternatives/Impacts

Two alternative methods to stabilize organic solutions are planned:

1. Immobilization of the organic solution in a solid absorbent and packaging the material as TRU solid waste. This would allow timely completion of solution stabilization, as current procedures and regulations allow this method of disposal.

2. Stabilization of the organic solutions in small batches using a pyrolysis furnace. This method is not developed, and could possible impact the polycube stabilization schedule as the same system would be used.

3.2.8 Technology Development

Work in the PPSL completed in April 1996 has developed and demonstrated the technology to be used at PFP for stabilization of aqueous Pu solutions. Pre-production testing by PPSL is nearly completed, to support the final design and operating parameters of the vertical calciner.

3.3 RESIDUES

PFP currently has in inventory twelve different types of Pu-bearing residues that contain less than 50 wt% Pu. These materials will be dispositioned via one of five paths:

- Accept As-is (continue storage in current form and in current packaging),
- Thermally stabilize and package in 3013 packages,
- Repackage in either 3013 packages or Interim Storage Criteria packages without further stabilization,
- Oxidize via pyrolysis followed by thermal stabilization and packaging in 3013 packages, or
- Cement and discard per WIPP Waste Acceptance Criteria (WAC), and

Each disposition path will be discussed in this section.

3.3.1 Accept As-Is

3.3.1.1 Scope. The scope of this portion of the Hanford SISMP addresses Pu residues that are acceptable as-is for storage up to 50 years. This includes unirradiated FFTF Fuel Pins and Assemblies (168 items containing a total of 714 kg Pu) as well as selected sealed Pu sources no longer necessary to support Hanford needs (202 items containing a total of 24 kg Pu). The determination of need for sources will be ongoing throughout the PFP Stabilization Program. No storage vulnerabilities exist for these items, and their packaging meets or exceeds the Interim Storage Criteria.

3.3.2 Thermally Stabilize and Package

3.3.2.1 Scope. This portion of the Hanford SISMP addresses mixed Pu/U residues that contain a combined total of more than 50 wt% actinides (Pu plus U) such as recovered Pu holdup, selected Pu compounds (26 items containing a total of 4 kg Pu) and MOX items not in fuel pins or assemblies (2297 items containing a total of 323 kg Pu plus 2097 kg U). These items will be treated the same as Pu oxides containing more than 50 wt% Pu. Further information related to this stabilization activity is in Section 3.4, "Metals and Oxides", of this document.

3.3.3 Repackage without Stabilization

3.3.3.1 Scope. The scope of this portion of the Hanford SISMP addresses plutonium residues such as alloys (126 items containing a total of 34 kgs Pu) and potentially some sealed Pu sources that are suitable for storage either in a 3013 package or a container compliant with the Interim Storage Criteria without any additional stabilization or treatment. Repackaging methods and capabilities are discussed below in Section 3.4 Metals and Oxides. Prior to any repackaging effort, the programmatic disposition of these items will be verified to ensure that effort has not been wasted and that burdens are not placed on the Material Disposition Program.

3.3.4 Pyrolysis Followed by Thermal Stabilization and Packaging

3.3.4.1 Scope. The scope of this portion of the Hanford SISMP addresses Pu-bearing polycubes and certain other combustibles. Organic Pu-bearing solutions may also be stabilized with this system. The inventory of combustible solids is comprised of 260 items including 1600 styrene cubes (polycubes) of various sizes containing a total of approximately 34 kg Pu plus 6 kg U. The miscellaneous combustible solids are contained in 12 items totaling 8 kg bulk weight with less than 1 kg Pu. Although listed as combustible, these items are not susceptible to spontaneous combustion and hence are not an imminent hazard. All are packaged and stored to allow venting.

Polycubes will be thermally stabilized, resulting in Pu oxide and MOX to be stored in accordance with 3013 criteria. Miscellaneous combustibles may require pyrolysis followed by thermal stabilization, packaging and storage. Other combustibles will be evaluated for discard to WIPP.

3.3.4.2 Concept of Operations. Addition of a pyrolysis system to PFP is being accomplished via Hanford Project C-227, Pyrolysis. The system will be installed in Building 234-5Z, Room 228B. The polycubes will be transferred from storage and unpacked in a feed preparation glovebox in Room 230B. The polycubes will then be transferred to the pyrolysis glovebox via conveyor for separation of the combustible styrene from the embedded Pu oxide. The resultant Pu oxides and MOX will be thermally stabilized to meet 3013 criteria in the muffle furnaces located in Room 230A. Polycube stabilization will begin before the SPS is operational; therefore, the oxides will be packaged to Interim Storage Criteria and stored in the PFP vaults pending direct repackaging in the SPS using 3013 packages (no restabilization is planned). Once in 3013 packages, the oxides will be placed in long-term storage in PFP vaults.

3.3.4.4 Remediation Process. Polycubes will require treatment to decompose and separate the polystyrene from the plutonium oxide. The polycubes will be treated in a two-stage pyrolysis system to decompose and vaporize the polystyrene, burn off the residual carbon, and stabilize the residual plutonium oxide. Development of the pyrolysis method and equipment is being conducted at Los Alamos National Laboratory (LANL) under direction from PFP. The development focuses on batch pyrolysis with offgas treatment. Three offgas treatment methods were considered: catalytic conversion, silent discharge plasma, and secondary combustion. The silent plasma discharge method was selected in July 1996; this equipment will be fabricated by LANL and delivered to PFP as part of the pyrolysis system. Post-pyrolysis thermal stabilization in the muffle furnaces is fully discussed below in section 3.4 Metals and Oxides.

3.3.4.5 Preparation. The preparation phase for polycube stabilization includes an engineering study completed in July 1996, a development program for the polycube stabilization system and installation of the pyrolysis system equipment (Project C-227). The development program is intended to gather information to select and design a polycube stabilization method. The engineering study documents the test data collected and the decisions made, and has served as a key input to the conceptual design process.

The stabilization method under development is two stages of pyrolysis to separate the styrene from the embedded oxides with final destruction of the styrene via off gas treatment. Three off gas treatment methods for pyrolysis were being considered: catalytic conversion, silent plasma discharge and secondary combustion. Process preparation activities are underway as follows:

- Testing began concurrently for the three off gas treatments. These tests were used to gain information to support the decision process and eventual implementation of the selected method. Following the completion of testing, silent plasma discharge was selected as the pyrolysis off gas treatment method and documented in an engineering study.

- Safety analysis for the polycube stabilization process will ensure safe operation and provide the proper safety documentation to comply with DOE Orders (DOE 5480.22 and DOE 5480.23) and BWHC management policies. Compliance with these requirements will help ensure that the environment, employees and the general public are not subject to undue risk due to the process.

- Procurement activities have begun to obtain the pyrolysis system equipment and operating controls as a "turnkey" system from LANL. Following procurement, a key decision to proceed will be made. The installation of equipment, development of procedures and the training of the operating personnel will begin.

- Readiness assessment scoping will be done to establish the breadth and depth of the readiness assessment prior to startup of the polycube stabilization process.

The readiness assessment will be conducted by BWHC in accordance with established readiness process procedures and DOE Order 5480.31. This readiness process will focus on the adequacy of hardware, personnel, and the administrative process necessary to support and maintain the safe operation of the stabilization activity. After the readiness process is completed and readiness is verified, DOE/RL will provide written authorization to proceed with the polycube stabilization program work to plant management. Completion of the readiness process concludes preparation activities required prior to startup of the polycube stabilization process.

3.3.4.6 Production. Startup processing of the polycube stabilization process will be initiated in July 1999 and will fulfill the requirement of Milestone "IP-3.3-028; Stabilization of Polycubes begins." Completion of the polycube stabilization process will occur in May 2000. Completion of this activity will fulfill the requirement of Milestone "IP-3.3-029; Stabilization of Polycubes completed." This material will be packaged to comply with the Interim Storage Criteria until the SPS is available, then repackaged to comply with 3013 criteria. Completion of these milestones will be documented by letter to RL.

3.3.4.7 Schedule Objectives. Details for stabilization of the polycubes are shown on the attached schedule in Volume 2 of the Hanford SISMP. The pyrolysis system will be operational by July 1999. All polycubes will be stabilized by May 2000. The resulting oxides will be repackaged to meet 3013 criteria before May 2002.

The pyrolysis system may be used to pretreat compatible miscellaneous combustibles if required for discard. Miscellaneous combustibles will be evaluated for disposition as waste to WIPP by July 1999.

3.3.4.8 Assumptions. N/A

3.3.4.9 Issues and Problems. N/A

3.3.4.10 Alternatives/Impacts. N/A

3.3.4.11 Technology Development. Hanford and LANL are cooperating on the development of a polycube stabilization method. The method being developed at LANL is two stages of pyrolysis with off gas treatment. Three off gas treatment methods were considered: catalytic conversion, silent plasma discharge and secondary combustion. The silent plasma discharge method was chosen in July 1996. Development activities were completed with the prototype demonstration at LANL in October 1996, and construction of the system for PFP is ongoing.

3.3.5 Cementation and Discard

3.3.5.1 Scope. The inventory of plutonium-bearing residues at the PFP includes sand slag and crucible (SS&C), incinerator ash, impure Pu oxides containing less than 50 wt% Pu, and other miscellaneous dry residues from prior process operations, some of which contain fluorides, calcium metal powder and pellets, and iodine. The inventory of these residues includes approximately 1381 items with a bulk weight of about 3,765 kg containing approximately 202 kgs of plutonium. An indeterminate amount of MOX containing less than 50 wt% actinides (Pu plus U) will also be dispositioned through cementation and discard to WIPP. These items are currently stored in various storage vaults in 234-5Z, 2736-Z, and 2736-ZB buildings.

Pu residues and sludges generated from clean out of process gloveboxes and equipment, or recovered during the terminal cleanout of process support equipment and ductwork, will also be prepared for discard to WIPP. As cleanup and deactivation activities continue, up to 72 kg of Pu may be recovered from PFP. Completion of the cleanout of PFP and dispositioning the recovered Pu-bearing material is beyond the scope of the PFP Stabilization program. However, the material that is recovered during the execution of the program will be dispositioned (via cementation or stabilization and storage) as if included in the program.

3.3.5.2 Remediation Objectives and Endstate. The objective of this activity is to immobilize and discard residues through cementation and packaging for discard as TRU waste to WIPP. The only reactive chemical constituent which will require pretreatment is residual calcium metal in the SS&C, which will be reacted with water prior to cementation.

3.3.5.3 Concept of Operations. The cementation process is very simple. It is based on two concepts, controlled reaction of calcium with water and immobilization of Pu-bearing residues in cement to meet WIPP WAC.

3.3.5.4 Remediation Process. The SS&C residue material will be transferred into glovebox HA-20MB in Room 235-B of Building 234-5Z, where each container is opened, the contents weighed, and processed through a jaw crusher. The crushed SS&C is then reacted with water. The primary process parameters for control are the hydrogen generation rate and glovebox humidity. Control is achieved by controlling the feed rate of residue material as it is added to chilled water in a mixer bowl (an industrial model mixer with a bowl capacity of a nominal five liters). After mixing, the solids are separated from the excess liquid (which is recycled) and the remaining slurry is mixed with cement. The wet cement is poured into cans, which are sized to make efficient use of the approved waste container. When the cement is cured, each can is sealed out of the glovebox, packaged, and shipped to the Hanford Central Waste Complex for storage pending final shipment to WIPP.

Non-reactive residues will be handled in the same fashion except the process will not require reacting calcium with water. This eliminates the need to control the hydrogen generation and the water temperature/glovebox humidity. The process for nonreactive residues is simplified to include only the crushing and cementing steps.

3.3.5.5 Preparation. Preparation for this process is complete.

3.3.5.6 Production. Cementing of selected residues for discard is an ongoing operation at the PFP, conducted on a 24-hour-per-day, 5-day-per-week basis. The cementing operation rate is constrained by the ability to move the feed from the vaults to the cementing glovebox. Peak throughput of approximately 9 kgs per 8-hour shift has been recorded. The sustainable rate is approximately 140 kgs per month.

Completion of residue cementing and discard will occur by January 2002. Completion of this activity will fulfill the requirement of Milestone "IP-3.3-027; Stabilization and repackaging of interim-stabilized materials completed. Completion of this milestone will be documented via letter to RL.

3.3.5.7 Schedule Objectives. A detailed schedule for stabilization and discard of SS&C and other residues is shown in Appendix B of Volume 2 of the Hanford SISMP. Highlights of the schedule are as follows:

- Cementation of SS&C started in September 1996, and is scheduled for completion in March 1998.
- Pu-bearing ash and other non-reactive residues will be cemented after the SS&C. Completion timing of the cementation/discard program will be dependent on the amount of MOX scrap that is discarded. It is expected that the program will be completed by the end of FY 1999. The schedule in Volume 2 assumes all MOX will be thermally stabilized, as that is the conservative assumption for resource usage.

3.3.5.8 Assumptions

- DOE will be successful in negotiating Tri-Party Agreement (TPA) commitments to allow cementation of residues and their discard as TRU waste without requiring any facility modifications or schedule delays for permitting.

- MOX scrap (non-fuel pins/assemblies) which contains less than 50 wt% actinides (Pu plus U combined) will be discarded to WIPP.

3.3.5.9 Issues and Problems. The following issues and problems have been identified which could affect the ability of the residue stabilization program to meet its program objectives.

1. Many of the items currently stored in PFP vaults are not fully characterized. Specifically, there is a lack of information regarding constituents other than Pu and U. Some chemical characterization will be required to stabilize or discard this material in accordance with the characterization implementation plan which is now being implemented as described in Section 3.5. The lack of net weights on many MOX items makes it impossible to accurately determine the amount of MOX scrap that will be cemented without handling of each item.

2. DOE approval of a strategy to discard a significant fraction of the miscellaneous solid residue as TRU solid waste will expedite completion of the stabilization effort. However, the suitability of some miscellaneous solids for disposal as TRU waste must be verified. At the same time, space allocations in the WIPP must be made to ensure adequate capacity at the facility to receive TRU waste from PFP.

3.3.5.10 Alternatives/Impacts. N/A

3.3.5.11 Technology Development. N/A

3.4 METALS AND OXIDES

3.4.1 Scope

This material category includes the current PFP inventory of Pu metals and oxide materials containing more than 50 wt% Pu. Oxides and metals at PFP consist of three groups: oxides of greater than 50 wt% Pu, MOX of greater than 50 wt% Pu plus U, and metals. The metals and oxides category includes 2,960 items containing 2,614 kg of Pu, including approximately 1 MT of Pu now under IAEA safeguards. The material under international safeguards must remain so while being stabilized and repackaged to meet 3013 criteria, or an equivalent amount of material will remain under IAEA safeguards while stabilization and repackaging occur. Also discussed in this category are MOX items classed as residues, but containing more than a combined 50% Pu plus U (see section 3.3.2). This category also includes three items with 1.2 kg of material received from the Mound Plant in July 1996.

3.4.2 Remediation Objectives and End State

The objective of this remediation is to transform remaining Pu metals and oxides to a stable form suitable for long-term storage in accordance with 3013 criteria. This objective will be accomplished via thermal stabilization in muffle furnaces and in the SPS. The SPS will be installed by Project W-460, Plutonium Stabilization and Handling (PUSH), which encompasses several related activities to assure the safe storage of high-assay Pu remaining at PFP for up to fifty years.

3.4.2.1 Concept of Operations. All high grade oxides and metals will be thermally stabilized and repackaged to 3013 criteria. However, there are minor differences in the processing paths of each material type as follows:

- Metals: Metals stored at PFP are typically high in ^{240}Pu and have too high a heat output per kg to allow storage as is in 3013 packages. These metals will therefore require transformation to oxides prior to packaging. The oxidation will be performed in muffle furnaces located in the 234-5Z Building. Two furnaces are currently operational, while an additional three furnaces will be ready for operation by March 1997. Existing gloveboxes will be used for handling of materials for loading and unloading the furnaces. Residual moisture testing will occur in an existing glovebox equipped with a new thermo-gravimetric analysis (TGA) system. Since the metals will be oxidized before the SPS is operational, the resultant oxides will be packaged to comply with the Interim Storage Criteria and stored in the PFP vaults until repackaging to 3013 criteria can occur in the SPS.

- Oxides: Oxides will be stabilized and repackaged in the SPS, unless they are found to contain impurities which make automated stabilization and handling undesirable or funding shortfalls delays the operation of the SPS. Materials for which this is the case will be thermally stabilized in the muffle furnaces in 234-5Z, packaged to Interim Storage Criteria and stored until transfer to 2736-ZB for repackaging to 3013 criteria in the SPS. Characterization and process testing will determine which items, if any, of PFP's oxide inventory are not compatible with the SPS.

- Mixed Oxides (MOX): MOX items including pellets, powders, and scrap with greater than 50 wt% Pu plus U are not within the scope of 3013. Hanford will develop the technical basis and stabilization criteria for safe storage of MOX in the 3013 package or in accordance with the Interim Storage Criteria. It is assumed that the thermal stabilization criteria in 3013 will be sufficient for long-term storage of MOX. As is the case with oxides, some MOX items may not be compatible with the SPS. These incompatible items will be stabilized in the five muffle furnaces, packaged to the Interim Storage Criteria and stored until transfer to the SPS for packaging in the 3013 container for long-term storage in the vaults.

3.4.3 Remediation Processes

Pu metals will be stabilization in PFP muffle furnaces. The resultant oxide will be packaged to comply with the Interim Storage Criteria and stored in PFP vaults until repackaging to 3013 criteria can occur in the SPS. The oxides and MOX materials will be stabilized and packaged in the SPS, unless they are found to contain impurities which make automated stabilization and packaging undesirable. Materials for which this is the case will be thermally stabilized in the muffle furnaces in 234-5Z, packaged to comply with the Interim Storage Criteria and stored in PFP vaults until repackaging to 3013 criteria can occur in the SPS.

MOX will be stabilized to a technical basis developed by Hanford that is compatible with storage in the 3013 package.

3.4.3.1 Preparation. Muffle Furnaces: For the two muffle furnaces currently installed at PFP, operations are ongoing and no preparation activities are required. In order to prepare for installation of three additional muffle furnaces to increase the plant's stabilization capacity, the following preparation activities have been required:

- The preparation phase for the three muffle furnaces began in May 1995, with design for the gloveboxes and room in which the furnaces will be located. A safeguards and security evaluation was completed for the area selected to receive the three furnaces. This evaluation defined required security upgrades for the thermal stabilization area. These activities were completed in December 1996.

- The preparation of safety analysis documentation will ensure safe operation and compliance with relevant DOE Orders (DOE 5480.22 and DOE 5480.23) and contractor management policies. Compliance with these requirements will ensure the protection of the environment and workers. Members of the general public are not subject to undue risk.

- Other ongoing or pending preparation activities include procurement and site preparation, security improvements, installation of the furnaces, development or revision of procedures to operate the furnaces, operator training, and testing.

- Readiness assessment scoping began in August 1996 to establish the breadth and depth of the assessment. The readiness assessment will be conducted by BWHC in accordance with established contractor readiness procedures that ensure compliance with DOE Order 5480.31. A RL review is planned at this time. After the readiness process is completed and readiness is verified, BWHC will proceed with operation of the furnaces. Completion of the readiness process concludes the preparation activities required prior to startup of the three new muffle furnaces.

Stabilization and Packaging System: Several related actions in preparation for SPS operation are encompassed by Project W-460. A key interface exists between SPS operation and vault modifications required accommodate storage of 3013 packages. Preparation activities critical to success include the following:

- A location assessment for the SPS was completed in June 1996. Rooms 641 and 642 in 2736-ZB Building were chosen for placement of the SPS.
- Functional Design Criteria development for SPS installation and vault modifications was completed in July 1996. Conceptual Design Report development was completed in January 1997, and project validation was completed in February 1997.
- Site preparation activities are required for Rooms 641 and 642. Current functions which utilize these areas will be relocated, which may require some construction within the building or potential installation of a mobile office unit. Structural preparations such as enhanced lighting and a temporary large equipment access will be made. The ventilation system capacities for both the support building and the storage vaults will be enhanced to allow proper operation of the glovebox system and to allow the increased storage density in the vaults. The capacity of utilities required for operation of the SPS was verified as part of conceptual design; certain existing utilities such as electrical power, do require reconfiguration and enhancement may be required. Gas supply systems will be added for glovebox inerting and laser welding.
- Surveillance equipment and international safeguards equipment currently in Room 642 will be relocated within the building to make space available for the SPS. Laboratory characterization equipment related to the packaging unit will be purchased and installed. It is anticipated that a radiography unit will be required for weld signatures and contents baselining. Three (based on SPS processing rate) calorimetry units will be purchased to accommodate the new 3013 package configuration, along with related equipment. Site preparation for these items will be undertaken in sequence to minimize disruptions to non-destructive analysis (NDA) laboratory operations.
- Via the common procurement agent (currently DOE Oakland), the design of the prototype SPS unit to be tested at Rocky Flats during 1997 will be modified to suit Hanford's needs, constructed, installed, and tested. It is anticipated that the vendor will install the SPS equipment. Certain surplus equipment currently at the Hanford Site will be used as feasible in the system, e.g. a glovebox for size reduction of impure oxide forms. Initiation of the complex-wide procurement completed the requirements for Milestone "IP-3.2-

028; Start engineering studies of a new repackaging line at Hanford." Completion of the installation will fulfill the requirement of Milestone "IP-3.2-029; Complete detailed design, equipment procurement, and installation of a new repackaging system at Hanford."

Within the SPS, items to be procured will include approximately thirteen gloveboxes and fume hoods with associated ventilation and service connections, two muffle furnaces, a laser welder, a variety of automated material movement equipment and a system control unit. Project W-460 funding includes procurement of 3013 packaging components.

- Secure vault storage in Building 2736-Z will be modified to accommodate 3013 packages. A minimum of two vault rooms must have equipment modified, and a third is anticipated. While fixtures, vault walls, floors, and ceilings will remain, the vault interior will be replaced. Security items such as bars, cages, seal holders and some electronic equipment will also be added, based on domestic and international containment and surveillance requirements. Operational sequencing (i.e., emptying Room A into another room) will be required to allow construction access while minimizing radiological dose.

- A readiness assessment will be conducted by BWHC for Project W-460 in accordance with established readiness process procedures that ensure compliance with DOE Order 5480.31. This readiness process shall focus on the adequacy of hardware, personnel, and the administrative process necessary to support and maintain the safe operation of the SPS and storage vaults. After the readiness process is completed and readiness is verified, RL will provide written authorization to proceed with SPS operation to plant management. Completion of the readiness process ends the preparation activities required prior to startup of the SPS. Completion of the readiness assessment fulfills the requirement of Milestone "IP-3.2-030; Train staff, prepare procedures, perform operational readiness testing (prior to commencing operations." Completion of these milestones will be documented by letter to RL.

3.4.3.2 Production. Muffle Furnaces: Processing capability for the five furnaces is expected to be about 1,500 kg per year. Following use of the muffle furnaces to stabilize residue items, the muffle furnaces will begin to stabilize metals and impure oxides incompatible with the SPS in September 1998. These materials will later be repackaged to 3013 criteria in the SPS. This activity will fulfill the requirement of Milestone "IP-3.2-033; Start restabilizing high assay oxides at the PFP." Milestone completion will be documented via letter to RL.

Stabilization of the oxides will require only the high-temperature soak period in the furnace. The stabilized product will be allowed to cool in a controlled environment and then repackaged in the SPS to 3013 criteria. Material processed before the SPS is operational will be packaged to comply with the Interim Storage Criteria and then repackaged later in the SPS to 3013 criteria.

PuSH Project W-460: The SPS will stabilize and repackage high-assay oxides and compatible MOX elements beginning in October 2000. The SPS will also be used to repackage alloys and other items stabilized in the muffle furnaces to 3013 criteria. SPS operation will take place over three shifts per day, five days per week. Approximately 3 MT Pu will be stabilized and/or canned in the SPS, including approximately 1 MT currently under IAEA safeguards at PFP. The material under IAEA safeguards will be processed through the SPS in a separate operational campaign after clean out of the SPS to eliminate commingling of inventory. The campaign is anticipated to require approximately 14 weeks.

SPS operation will fulfill the requirement of Milestone "IP-3.2-031 Commence repackaging operations at Hanford." Interim milestones are also associated with SPS operation as follows:

- Stabilization of metals in the muffle furnaces will be completed by March 1999. Repackaging of alloys and oxides (formerly metals) in the SPS will be completed by May 2002. Completion of this activity will fulfill the requirement of Milestone "IP-3.2-032; Complete Metal Repackaging at Hanford."
- Completion of stabilization and repackaging of all oxides and alloys will fulfill the requirement of Milestone "IP-3.2-018; Thermally Stabilize and Repackage all Plutonium Oxide to meet the Metal and Oxide Storage Standard." This activity will be completed by May 2002.
- As stated above, completion of high assay oxide stabilization using both muffle furnaces and SPS by May 2002 fulfills all milestones associated with DNFSB Recommendation 94-1. Completion of these milestones will be documented by letter to RL.

3.4.4 Schedule Objectives

A detailed schedule for stabilization and repackaging of metals and oxides is contained in Volume 2 of the Hanford SISMP. Highlights of the metals and oxides schedule are as follows:

- In January 1997, the Conceptual Design Report for Project W460 was completed. The Project was validated in February 1997. Advanced Conceptual Design will begin in October 1997.
- Hanford will place an order via the national procurement in January 1999 for one SPS unit. The vendor will install the SPS at PFP by June 2000.

- The SPS will be ready for operation by October 2000.
- Stabilization of metals will be completed by December 1998.
- Stabilization of oxides will be started in January 1999, and completed by May 2002.
- By May 2002, all at-risk materials at PFP will be either stabilized and discarded to WIPP, or stabilized and repackaged to 3013 criteria.

3.4.5 Assumptions

The following assumptions are used in the development of the management plan for the metal and oxides schedule.

1. Adequate Line Item funding will be provided for Project W-460, "Plutonium Stabilization and Handling" to enable SPS procurement and installation plus associated vault modifications.
2. Total throughput for the five muffle furnaces is expected to be roughly 1,500 kg of Pu per year. Throughput for the SPS is expected to be approximately 1,800 kg of Pu per year.
3. All metals will be thermally stabilized to oxides and stored to meet 3013 criteria.
4. 3013 criteria will be appropriate for stabilization and long-term storage of MOX.
5. No commingling of items under IAEA safeguards with other items in storage at PFP will take place without prior IAEA approval.
6. No additional material will be offered for IAEA safeguards at PFP until the material has been stabilized and repackaged to 3013 criteria.

3.4.6 Issues and Problems

The following issues and problems have been identified that could affect the ability of the stabilization program for metal and oxides to meet its objectives.

1. Many of the items currently stored in PFP's vaults are not fully characterized. Specifically, there is a lack of information regarding the non-Pu constituents. Some chemical characterization may be required to allow safe stabilization or discard of this material in accordance with the characterization implementation

plan which is now being implemented as described in Section 3.5, and will not impact current schedules.

2. The presence of approximately 1 MT Pu under IAEA safeguards requires integration of IAEA safeguards with stabilization activities. Significant policy, ES&H and resource allocation issues are associated with application of IAEA safeguards during stabilization. Discussion is underway with DOE, the IAEA and other impacted sites in the DOE complex to identify the least costly and least resource-intensive safeguards option which meets the requirements of the United States nonproliferation policy.

3. The equipment similar to the SPS which is currently operating at the BNFL THORP facility in Sellafield, England is processing a physically homogeneous inventory of free-flowing oxides with greater than 85 wt% Pu. The heterogeneous inventory at PFP stands in contrast to current BNFL operating experience,. which may affect design and operating parameters for the Hanford SPS unit.

3.4.7 Alternatives/Impacts

1. Oxides items greater than 50 wt% Pu which are incompatible with the SPS in their current form will be stabilized in the muffle furnaces and repackaged in the SPS to 3013 criteria as appropriate.

2. Two broad alternatives are currently under consideration for the integration of IAEA safeguards at PFP: application of safeguards to the SPS to maintain the material under constant IAEA control; and replacement of an isotopically equivalent amount of thermally stabilized Pu for the 1 MT Pu now under IAEA safeguards so that the current inventory under IAEA safeguards may be stabilized without safeguards. A policy decision is required by December 1997 so that IAEA requirements such as sample ports for the SPS may be ordered without delay to the programmatic schedule.

3.4.8 Technology Development

1. Functional Design Criteria for SPS installation and associated vault modifications were completed in July 1996. Development of Conceptual Design Requirements was completed in February 1997.

3.5 CHARACTERIZATION OF Pu-BEARING MATERIALS

Containers of Pu-bearing materials will be classified according to their content and container integrity into the following bins:

Bin A Meets stability requirements of current Hanford Storage Specifications and will meet Interim Storage Criteria as is.

Bin B Meets stability requirements of current Hanford Storage Specification but would require repackaging to meet Interim Storage Criteria.

Bin C Needs thermal stabilization to meet Interim Storage Criteria or 3013 criteria.

Characterization of the inventory in storage at PFP will be a multi-step task:

- Review of contents documentation for each item,
- Initial determination of the appropriate bin for each item and its container,
- Radiography of selected containers to gather data on contents and containment conditions,
- Sampling and analysis of selected item contents and containers, and
- Final determination of appropriate bin for each item, which in turn specifies the appropriate stabilization path.

An inventory characterization implementation plan has been prepared to establish the framework for performing this characterization. Detailed work plans will be used to provide specific work instructions for the selection of items to be examined and direct the analyses to be performed. The first phase work plan implementation was conducted in March 1996. It included provision to perform digital radiography on selected containers. Based on those results, detailed container examinations and chemical analyses were conducted for a selected portion of the PFP inventory. Evaluation of these data will form the basis for subsequent phases to provide finer characterization detail for the inventory.

This effort will provide a risk basis for the sequencing of repackaging or stabilization to ensure continued safe storage as well as minimize risk during storage until disposition is complete. This will also ensure the proper stabilization process is used on each item.

Laboratory capabilities at the Hanford Site will require upgrades to support the necessary characterization and analysis of Pu-bearing materials and transuranic wastes. The upgrade task is ongoing. The capacity of the NDA Laboratory will be enhanced via the PuSH Project W-460.

3.6 INTERNATIONAL ATOMIC ENERGY AGENCY INTERACTION

Approximately 1 MT Pu of PFP's inventory is currently under IAEA safeguards. In accordance with US nonproliferation policy, additional material may be offered for Agency safeguards in the future. For these reasons, the IAEA interface is critical to the success of PFP's stabilization program. In conjunction with stabilization activities, PFP will also be installing vault modifications to accommodate storage of 3013 packages. With DOE and Department of State assistance, PFP is seeking IAEA input regarding key interfaces that exist for stabilization processing, vault configurations, and potential IAEA safeguards regimes that could be utilized to stabilize the material currently under IAEA safeguards.

Three areas of concern require programmatic/policy resolution before international safeguards can be effectively integrated into the PUSH planning process. In summary, these are:

1. United States policy regarding integration of IAEA safeguards and stabilization activities at PFP must be formulated. This decision must take into account weapons nonproliferation objectives, ES&H priorities and resource allocation issues associated with application of international safeguards during stabilization. Several safeguards options have been informally discussed with DOE and the IAEA. Information has been forwarded to the State Department for formal discussion with the IAEA.

2. Selection of a safeguards containment and surveillance (C/S) option for vault modifications is needed. Enhanced C/S features installed during upcoming vault modifications will greatly simplify future IAEA inspection regimes at PFP in terms of less frequent and less intrusive inspections. PFP is considering an upgrade to "triple C/S," that is triple redundancy, because of the world-wide experience of frequent C/S failure. IAEA input is being sought in this regard.

3. The use of NDA to determine item assays for IAEA Safeguards inspections at PFP is being sought. The most accurate IAEA safeguards measurements have traditionally been obtained via weighing, sampling and destructive assay (DA) techniques which require opening sealed cans of Pu. Hanford has developed high-accuracy calorimetry, a non-destructive assay (NDA) measurement technique, which may present a more viable option for highly-accurate bias defect measurements, given the highly heterogeneous quality of the Hanford Pu inventory. Use of calorimetry also offers worker safety, cost and schedule advantages. IAEA input is being sought to determine whether calorimetry may be accepted for these purposes and whether the IAEA may use calorimeters which are compatible with 3013 packages. Calorimeters are currently under development at LANL which are capable of performing non-destructive assay on 3013 packages. This design is expected to be available and validated by the IAEA by August 1997.

IAEA input will be critical to the success of this international safeguards and stabilization program integration. In October 1996, PFP submitted its conceptual plans for vault modifications with IAEA safeguards to the Agency for review and comment. The layout plan for the SPS was also be submitted for IAEA information. Feedback is anticipated in late 1997.

3.7 WORK PLAN

Cost, schedule, and technical baselines for the Pu-bearing materials discussed in the Hanford SISMP are provided within this document. Cost and schedule performance will be monitored on a monthly basis, and variance reports will be submitted to RL by the PFP Program Manager on the tenth working day of each month. Each task or activity is covered by a schedule bar on the GANTT chart and by a Work Breakdown Structure (WBS) Cost Account. A PFP Cost Account Manager is assigned to each activity and is responsible for cost and schedule performance under that activity. The PFP Cost Account Manager reports performance to the PFP Program Manager on the first of each month. The variance report by the PFP Program Manager will cover any variation between the baseline and actual schedule or cost account with explanation and plans for necessary corrective action. The technical baseline is subject to formal change control and cannot be changed without the change control process.

The Program baseline is reviewed and changed as necessary every six months. The formal change control process will govern any change to the Program baseline.

Funding requirements to meet DNFSB Recommendation 94-1 IPP commitments for PFP are shown in Table 3-4. The total project costs are identified for reference purposes.

Table 3-4. Funding Requirements Plutonium Finishing Plant Transition Project Stabilization Activities[a] ($ 000)

	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	TOTAL
Oxides, Metals & MOX	$ 2,975	$13,443	$23,940	$ 9,727	$ 8,711	$ 4,213	$ 63,009
Residues	2,482	3,137	3,288	1,927	779	1,193	12,806
Solutions	6,665	3,414	0	0	0	0	10,079
Facility Terminal Clean Out	1,442	0	3,357	3,926	7,387	7,796	23,908
Lab Upgrades	348	0	0	1,662	647	0	2,657
Project Management	3,175	5,320	5,015	5,689	5,828	6,980	32,007
TOTAL	$17,087	$25,314	$35,600	$22,931	$23,352	$20,182	$144,466

[a] Data current as of April 2, 1997

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APPENDIX A

FACILITY DESCRIPTIONS

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APPENDIX A: FACILITY DESCRIPTIONS

KE and KW Basins

The KE and KW Basins are located in the 100 Area of the Hanford Site. The basins are constructed of reinforced concrete walls and floors. The dimensions of each basin are 38 meters (125 feet) long, 20 meters (67 feet) wide, and 6 meters (21 feet) deep. The KE Basin walls are a constant thickness of 69 cm. The KE Basin has neither sealant nor liner on its concrete. The KW Basin has an epoxy sealant, but no liner.

Each basin is enclosed by a one story steel framed building. The building also houses the water treatment and cooling systems. The roof structure of the steel frame includes a monorail fuel transport system. A personnel floor grating system covering the entire basin, is suspended from the roof.

Water levels are maintained in the K Basins at a minimum of 3 m above the irradiated fuel to cool the fuel and provide radiological shielding for personnel working in the facility. The water retention boundary extends into the auxiliary pits located on the east and west ends of the basins. The water in each basin is recirculated through a closed loop water-cooling system using mechanical chillers. Filters and an ion exchange system maintain basin water clarity and remove radionuclides. Used filters and spent ion-exchange system components are disposed of at the Hanford 200 Area Low-Level Waste Burial Grounds.

The fuel is stored in canisters on the bottom of the basins in single stacked storage racks. The canisters are approximately 74 cm high, have two cylindrical barrels which are approximately 23 cm in diameter, and normally contain 14 fuel elements. A significant fraction of the fuel has damaged cladding which occurred at reactor discharge or during subsequent fuel handling, or resulted from uranium metal oxidation during storage. The loss of cladding integrity allows soluble and gaseous fission products to be released into the canister water. The canisters used in the KE Basin do not have lids and thus allow free exchange of water between the canister and the basin. Some of the canisters in the KE Basin also have screen bottoms. All of the canisters in the KW Basin have closed lids and bottoms.

Using hoists and separately attached lifting rods, canisters can be moved along an underwater path which corresponds to the route of the interconnecting network of slots built into the floor-grating covers. The canisters can be shifted to and from the storage basins into the abutting pits or pickup station for subsequent unloading, loading, reviewing, or inspection operations as needed.

In the KE Basin, a significant amount of sludge has accumulated on the floor. The sludge consists of zirconium oxide, iron oxide, concrete grit, and other materials that have mixed with fission products and fuel pieces, the fuel pieces having escaped from open storage canisters or remaining from previous fuel encapsulation activities.

The K Basins each currently have about 25% unused capacity (assuming no stacking), although encapsulation of the KE fuel and accumulated sludge would eliminate the unused capacity in the KE Basin. Fuel enrichment only up to 0.947% is allowed in the KE Basin because of the sludge accumulation on the basin floor.

Access to the K Basins is by rail. Cask handling capability at the basins are similar and fairly restrictive. Crane capacity is 27 metric tons. Casks must be loaded under water and must be less than 2.6 m tall. The cask transfer pit is 2.1 m by 2.8 m, but framework within the loading pit reduces the free clearance to 1.5 m by 1.2 m. Also, only the transfer pit located on the south side of the basin is functional.

T Plant

The 221-T Building is a 259 m (850 ft) long by 21 m (68 ft) wide by 23 m (74 ft) high reinforced concrete canyon building. T Plant was originally designed for recovery of plutonium from defense production reactor fuel. The building consists of the canyon, three galleries, one shielded craneway and a "headend" facility. The canyon area consists of 37 cells and one railroad tunnel entrance/exit. Shielding walls made of 3-m-thick (9 ft) reinforced concrete separate the cells from the electrical and pipe galleries. The operating gallery is separated from the canyon deck by a 1.5-m-thick (5 ft) concrete wall that extends 3 m (9 ft) towards the ceiling. Most of the cells are covered by four 2-m-thick (6 ft) reinforced-concrete blocks. The original equipment has been removed from some to the cells. The 221-T Building canyon pool cell (Cell 4) was modified for the storage of the PWR Core II irradiated fuel. This concrete cell has a fabric liner between white concrete and grey reinforced concrete.

Cell 4 is adjacent to the railroad tunnel and contains a 4 m wide by 8.4 meter long pool with a capacity of about 200,000 l. Filtered, demineralized raw water is used for the initial pool fill. An installed demineralizer provides make-up water to replenish pool water lost by evaporation. An ion exchange column, installed in a radiation shield near the pool, is provided for removal of radioactive contamination from the pool water and for maintaining water quality. Two pumps, each capable of providing a flow of 38 l/min, are installed for recirculation of pool water through the ion exchange column and the water chillers. Two chillers, each capable of removing up to 133,000 kJ per hour of radioactive decay heat, are installed near the pool. One pump and one chiller will normally be on standby. A catwalk is placed 1.5 m above the pool to allow access to the pool for sampling and maintenance. All fuel must be handled remotely. The water depth in the pool cell is 5.8 meters (19 feet). Each assembly is stored vertically in a separate compartment of a rectangular metal rack.

Fast Flux Test Facility

Until recent defueling of the FFTF reactor, FFTF assemblies were stored within several different systems at FFTF. Irradiated assemblies were stored within the reactor core, the in-vessel storage (IVS), the interim decay storage (IDS), and the fuel storage facility (FSF). Some irradiated fuel pins were shipped off-site for detailed examination and a few assemblies were temporarily located within the IEM cell, while they were examined. Irradiated assemblies were handled remotely and those within the reactor core, the IVS, the IDS, and the FSF were cooled with liquid sodium. Assemblies were routinely moved between the reactor core, the IVS and the IDS; but once placed in the FSF, fuel assemblies were not reinserted into the reactor. The following paragraphs describe storage at each of the FFTF systems although the reactor has been permanently defueled.

The reactor contains the fueled and non-fueled assemblies, and provides radiation shielding, cooling, and instrumentation to allow safe operation. The reactor is also equipped with instrumentation which permits monitoring of assembly temperature and coolant flow, but is not part of the plant safety system.

The reactor core contains fueled, non-fueled, and control rod assemblies, as well as radial reflectors and shield components, which function together to create a controlled, fast neutron environment. The core consists of nine rows of vertical elements arranged in a hexagonal array. The active zone consists of the 91 positions of the six inner rows. It can be loaded with as many as 82 fueled and non-fueled-test assemblies, with the other nine positions occupied by control rods. The active zone is surrounded by three rows of reflector assemblies.

The IVS is located within the reactor core barrel, but outside of the core region. Fuel stored in the IVS enables the reactor core to be reconfigured during an operating cycle, without opening the reactor vessel. The IVS consists of three storage modules within the reactor, each serving one-third of the reactor core. Each module provides 19 natural-circulation, sodium-cooled receptacles for core components. Each IVS module consists of a top and bottom plate welded together with an elliptical shaped body. The storage receptacles are cylindrical tubes supported by the top and bottom plates. Heat is rejected through the same primary coolant system that services the reactor core.

The IDS is located within the reactor containment building, but outside of the reactor core. It provides a controlled environment for temporary storage of irradiated fuel and other core components between irradiations in the reactor core. The IDS also provides temporary storage of new assemblies and other core components enroute to the core. The IDS is in a rectangular, steel-lined concrete cell. The IDS consists of a rotatable storage basket, contained in a sodium filled, argon inerted, stainless steel primary vessel. A carbon steel guard tank surrounds the primary vessel to help ensure adequate sodium cooling even if the primary vessel were to leak. The atmosphere outside the primary vessel, but within the concrete cell, is nitrogen which also serves as a heat transfer medium to control the cell temperature.

There are 122 storage positions for fueled components and other core components, arranged in five concentric circles. The outer four circles can store 112 of the 3.7 m long core components while the inner circle can store ten special 12 m long non-fuel assemblies. In order to accommodate these different length assemblies, the IDS has a relatively small cylindrical lower section connected to a larger upper section. The lower cylinder is approximately 6 m long and 0.25 m in diameter. The upper section is a cylinder 3.8 m long and 3.7 m in diameter. The transition between these sections is a conical section approximately 2 m long. The primary vessel contains about 60,000 kg of sodium.

The decay heat of an assembly placed in the IDS must be no greater than 10 kW, while the total inventory decay heat is limited to 155 kW. Decay heat is dissipated by either the primary sodium system for the reactor or the backup nitrogen cooling system.

The FSF is located at the FFTF, in a separate building from the reactor containment building. It provides a controlled environment for longer term storage of irradiated fueled components and other core components. The FSF consists of a primary storage vessel, several closed loop systems and supporting facilities. The fuel is held in a rotatable storage rack contained in a sodium filled, argon inerted, carbon steel primary vessel. A surrounding carbon steel guard tank ensures adequate sodium containment and cooling, in the event of a primary vessel leak. The FSF is housed in a building of standard industrial above-grade construction and reinforced concrete below-grade construction.

The primary vessel contains 466 positions for assemblies and Ident 69 containers (containers of irradiated assembly fuel or blanket pins) arranged in concentric circles, although only 380 are currently usable due to criticality considerations. The primary vessel is about 6.9 m in diameter and 7.3 m long. It is supported by a flange at the top and contains about 100,000 kg of sodium. The decay heat of an assembly placed in the FSF must be no greater than 1.4 kilowatts.

Decay heat is removed from the stored materials by natural circulation of the vessel sodium. The sodium transfers heat to two separate sodium-potassium heat transfer loops, which reject the heat to the atmosphere through a natural draft heat exchanger in each loop. Each loop has a heat removal capacity of 205 kW.

The FSF is designed to interface with the FFTF fuel-handling equipment to facilitate insertion and removal of fueled and non-fueled core components, as are all the FFTF facilities where fuel is held. The FSF makes use of the Bottom Loading Transfer Cask and the FFTF floor valve for these operations.

324 Building

The 324 Building accommodates the study of chemical processes from laboratory to pilot scale at levels of radiation varying from natural background to megacuries (MCi). It also permits examination and mechanical testing of irradiated specimens. The 324 Building contains the laboratory, support facilities including hot cells, and offices required to pursue technical laboratory operations.

The 324 Building is 62.5 m by 71.6 m in plan and 13.7 m in height above ground level. The 324 Building has a partial basement, first, second, and partial third floors for a total of approximately 9,450 m^2 of floor area. The foundation structure is poured-in-place reinforced concrete. The superstructure is constructed from insulated, fluted-steel, industrial panels supported on a structural steel frame.

Fuel in the 324 Building is stored primarily in two hot cells:

- B Cell - is 6.7 m wide x 7.6 m long x 9.3 m high. The cell is m below grade and extends 6.2 m above ground level. The floor and walls are lined with stainless steel. The cell is serviced by two remotely operated cranes with 2.7 and 5.4 metric tons capacity, respectively. These cranes travel through a 5.2 m high doorway into the neighboring Airlock Cell.

  The cell is surrounded on three sides by operating galleries on the first and second floors and on two sides by a gallery at the basement level. Shielding walls at the three operating faces of the first-floor operating gallery level are 1.2 m thick, high density concrete. Each of these walls has a large viewing window, two master-slave manipulators, and a number sleeved holes for supplying services to the cell. There are two cubicles on the west wall of B-Cell. The remaining cell-to-gallery shielding walls are 1.4 m and 1.2 m thick normal concrete at the first and second floors and basement, respectively.

- D Cell - is 4.0 m wide x 6.4 m long x 5.2 m high and is located directly over C-Cell. The floor between the cells is 0.6 m thick with a removable floor plug. The short east and west walls are 1.7 m thick normal concrete and border on the Cask Handling Area and operating gallery, respectively. The long north wall is 1.1 m thick normal concrete and borders on the Airlock Cell. The long south wall is 1.2 m thick, high density concrete and borders the operating gallery.

  D-Cell is similar to other RE cells (A and C cells) and has two shielding windows, two pair of master-slave manipulators, a remote viewing periscope, and closed-circuit television. The floor is lined with stainless steel; the walls are lined with mild steel with a corrosion-resistant coating. Access to the cell is via the Airlock Cell or through a small transfer port communicating with a glove box. This glovebox is used for experiments using microcuries of radioactive materials in encapsulated form and connects to the ventilation system. A small 10 cm pass-through port is available for one-way movement of materials into the cell. All normal operations in D-Cell are done remotely; all services and facilities are provided at the front face and connected through shielding plugs or offset piping.

Although there are rail spurs in the 300 Area, no direct rail access to the 324 facility is available. Any movement of materials to or from the facility would need to be done by truck. The facility has an overhead crane with a capacity of 27 metric tons, which could be used to move the fuel inside the building. There are also some restrictions to movement of heavy or large objects within the facility, specifically, the floor loading capacity is limited to 978 kg/m^2. The hot cell air lock height is also somewhat limited.

The fuel is stored dry in racks within the cells. Air provides the necessary cooling and is filtered by high efficiency particulate air filters before discharged through an exhaust stack. The fuel is handled remotely with cranes and master-slave manipulators.

325 Building

The 325 Building was designed to provide space for radiochemical research. The building, located in the 300 area of the Hanford Site, houses the 325-A Radiochemistry Facility and the Shielded Analytical Laboratory. The 325 Building consists of 1) a central portion (completed in 1953) containing general purpose laboratories modified for low-level radiochemical work by provision of special ventilation and work enclosures; 2) a south (front) wing containing office space, locker rooms, a lunch room and maintenance shops; and 3) east and west wings provided with shielded enclosures and remote manipulators for high-level radiochemical work.

The central portion of the building is 59.1 by 59.8 m on three floors (basement, ground, and second) and contains over 100 laboratories and offices. The south wing is 22.6 by 40.5 m on two floors and contains offices, a conference room, a machine shop, a lunch room, and rest rooms. The east wing (325A), known as the High-Level Radiochemistry Facility, housing the process research hot cells, truck lock, and manipulator repair, is 14.6 by 39.6 m with a 12.2 by 12.8 m service area/truck lock addition. The west wing (325B), known as the Shielded Analytical Laboratory, is 16.2 by 16.5 m and houses additional process research hot cells. Small fuel pieces are stored in the hot cells in both the High-Level Radiochemistry Facility and the Shielded Analytical Laboratory.

The High-Level Radiochemistry Facility contains three interconnecting cells (A-, B-, and C-Cell) and supporting facilities for work with megacuries of radionuclides. Two of the cells have inside dimensions of 1.8 m wide by 4.6 m high by 2.1 m deep; the third cell has inside dimensions of 4.6 m wide by 4.6 m high by 2.1 m deep. The three cells are enclosed in a 25 m by 14.6 m steel-framed, reinforced-concrete structure. These cells are shielded with walls of 1.2 m thick, high-density concrete on the front and sides and 0.9 m thick, high-density concrete on the back. Remote operation of the cell equipment is performed in the "front face" operating gallery; movement of materials takes place in the rear support gallery. The rear support gallery also provides access to the cells. The cells are ventilated by air drawn from the rear face gallery and exhausted through testable HEPA filters. The cells are constructed on the first-floor level and supported by heavy reinforced-concrete piers, columns, and pilasters. The basement level contains exhaust ducting, HEPA filters, and other miscellaneous services to the cells. The front side contains manipulators, service ports, and high-density lead-glass windows having equivalent shielding to that of the walls. Each cell has a 45.7 cm thick Meehanite iron door shielding the main entrance and other smaller entry ports on the back.

B-Cell currently contains a core extruder and analytical measuring equipment used for the tank waste characterization program. A-Cell and C-Cell contain contaminated equipment from canceled programs, for which clean-up is not currently funded. Currently A-Cell and C-Cell are also being used to characterize tank waste.

The Shielded Analytical Laboratory contains six interconnecting "hot" cells and two separate hot cells. The interconnecting cells are 1.7 m by 1.7 m compartments inside shielding walls. These compartments are divided into three groups of two compartments each, separated by hollow 10.2 cm thick sheet metal dividers. The shielding walls on the east and north sides of the cells are 30.5 cm of Meehanite iron. Shielding walls on the west and south sides are 66 cm of magnetite concrete. The east side of each compartment is equipped with two manipulators and with high-density, lead-glass viewing windows having the same shielding effect as the walls. These compartments are used for analytical chemistry operations on small amounts of highly radioactive materials such as samples of single-shell tank waste. Operations within the cells are by manipulator or other remote equipment. The other two hot cells are in a separate room and are two all-metal cells. One cell is 2.0 m long by 1.4 m wide by 2.5 m high, inside dimensions, with 15 cm thick walls and roof. The other cell is 1.7 m long by 1.5 m wide by 1.5 m high, inside dimensions, with 15 cm thick walls and roof. This cell sits on a pedestal that is 81 cm above the floor. Both cells have shielded viewing windows, two master-slave manipulators, an access door, and a pass-through port.

Although there are rail spurs in the 300 Area, no direct rail access to the 325 facility is available. Any movement of materials to or from the facility would need to be done by truck. The 325A Wing has an overhead crane with 27 metric tons capacity and the 325B Wing has an overhead crane with 2.7 metric tons capacity, which could be used to move the fuel inside the building.

327 Building

The 327 Building is a single-story structure with a partial basement. Maximum dimensions are 65.5 m long by 42.7 m wide by 9.8 m tall and the building is roughly cruciform in shape. The total work area is approximately 2,330 m^2 with 929 m^2 of laboratory and work areas; 195 m^2 of offices; 223 m^2 of storage areas; and 975 m^2 of common areas containing ventilation and auxiliary equipment. The building framework is welded steel. The exterior walls are fluted steel insulated panels. The primary operating area is on the main floor and includes 11 hot cells, two small shielded cells, two small water pools, the area around the cells (the canyon), and the bays connected to the canyon in which auxiliary operations are performed.

A 13.5 and a 18 metric ton bridge crane are used to transfer casks containing radioactive structural materials or fuel from the receiving area to the cells or between the cells, and for general lifting and transfer service in the canyon.

Materials unaffected by air are examined and tested in shielded cells with an air atmosphere. Cells A through I are shop-fabricated from high-density cast iron (Meehanite) having a specific gravity of 7.3. The base, walls, and top cover are fitted together by a groove-dowel, lock-together design. The shielded cells rest on a reinforced concrete floor. If direct access is required, a wall may be removed to permit maintenance or to make changes in process or handling equipment.

Most operations in the cells are performed with manipulators. Spaced symmetrically about the iron cell walls are interchangeable plugs that lock in place by expanding retaining rings. Services and viewing ports are supplied through special plugs.

The two lead-brick shielded cells are used for density determination and for deposition of surface films for electron microprobe studies.

The Special Environmental Radiometallurgy Facility or SERF Cell provides an examination and storage facility with a nitrogen atmosphere for specimens that may be affected by air. The facility consists of an upper operating area and a lower storage area. A detachable shielded enclosure at the north end, with access to the operating cell, houses a remote metallograph for photomicrography, microhardness testing, and sample viewing at high magnification. Two airlocks provide access for entry or removal of test materials, supplies, equipment, and waste without compromising the integrity of the cell atmosphere. Operating equipment is designed to be located entirely within the cell, and operations are performed with manipulators.

The SERF storage cell is located in the basement and is connected to the operating area by a transfer tube. There is a thickness of 1.75 m of concrete between the ceiling of the SERF storage cell and the floor of the main SERF cell above. Shielding consists of 0.6 m of concrete on all sides with 10 cm of lead shielding on the north and west sides and 27 cm of steel on the operating (east) face. The south side is inaccessible since it is adjacent to a building support wall. A manipulator is provided to permit positioning and retrieval of materials in the storage area. Three storage racks are located in the cell, on the wall opposite and on the two walls adjacent to the operating face of the cell. The racks accommodate 6.4 cm diameter by 10.2 cm long sample cans and other smaller containers. The three storage racks contain a total of 460 locations.

The purpose of the wet storage basins is to store incoming material before examination and out-going material before shipment. The larger storage basin is 3 m wide by 4.6 m long by 5.2 m deep, with an 2.6 m deep underwater shelf, 1.2 m wide, across the width of the basin. The smaller basin is 1.8 m wide by 2.4 m long by 3 m deep. A canal 0.5 m wide by 3 m deep connects the large and small basins, to facilitate movements of material from one storage basin to the other. Two 225 kg jib cranes, one serving each basin are used to transfer materials in the basins. A transfer tube connects Cell A and the small basin. A mechanical sample carrier in the tube provides for sample transfers between cells and the basins. Water quality in the basins is maintained by molecular filters and mixed bed deionizers.

Several racks are located in the large basin for storage of fuel and structural materials. There is one breeder reactor fuel pin storage rack, capable of holding up to 200 pins in a rigid array. The rack consists of 76 cm long, 2.5 cm diameter stainless steel tubes arranged in a 4 x 50 rectangular array. The tubes are welded into a box-like structure with a stainless steel frame and side panels. The rack sits on the basin floor with the storage tubes oriented vertically. A lifting ring is permanently attached to the top of the rack. The entire rack is 168 cm long, 61 cm wide, and 76 cm high. A wall rack for containers holding individual pins or structural specimens and a peg rack for holding tubing or duct material are located on the north wall of the large storage basin.

The irradiated fuel is stored in several different locations within the Postirradiation Testing Laboratory of 327 Building. The intact fuel pins are stored in a rack in a water basin and in various facility hot cells. The partial fuel pins and small fuel pieces are stored in small cans on shelves in the thirteen hot cells, and in a small dry storage vault.

200 Area Plutonium Finishing Plant

The PFP complex is located within the 200 West Area of the Hanford Site. The principal structure, 234-5Z Building, was completed in 1949 to complete the purification of plutonium from Hanford reactors for production of weapons parts. The PFP received plutonium nitrate solutions from the PUREX plant for reduction to plutonium metal and fabrication of parts. In 1989, the final production of plutonium metal for defense purposes ended abruptly without extensive cleaning of the process areas.

Various forms of plutonium were purified and produced during the operating life of the PFP. The primary product was plutonium metal in the form of ingots called "buttons", produced in the RMA Line and the RMC Line. Plutonium oxide was also produced in the RMA Line. The PFP had the capability to process both weapons-grade material (containing Pu^{239} with about 6% Pu^{240}) and fuels-grade material (containing Pu^{239} with about 12% Pu^{240}). In addition to the processing of plutonium produced in Hanford reactors, the PFP has received and processed materials from other DOE reactors and facilities during its operational life. Some of these materials remain in PFP storage vaults, including a significant amount of plutonium oxide with greater than 12% Pu^{240}.

When processing was stopped at the PFP, reactive forms of plutonium remained in several of the main processing areas in addition to an extensive inventory of partially stabilized plutonium forms stored in the secure vaults. The inventory of materials remaining in process areas is contained in the main body of this document. A brief description of the major PFP structures which are of interest to the PFP stabilization effort follows:

The 234-5Z Building is 152 meters (500 feet) long and 55 meters (180 feet) wide, with four levels: basement, first floor, duct level and second floor. The frame is structural steel with an outer sheathing of aluminum panels over rock wool insulation and 16-gauge sheet metal. There are also 20-cm (8-in) thick internal reinforced concrete walls, principally running in the longer east to west direction, which extend only to the second floor. Within the 234-5Z Building, various areas house remaining equipment from two plutonium metal production areas and parts fabrication equipment, various purification processes, secure storage vaults, several laboratories and related support areas, extensive ventilation/filtration systems, support office areas and personnel changing rooms. Some processing equipment, primarily the fabrication line and some small purification processes, was removed earlier in the plant history, but the majority of processing equipment remains. The primary areas which contain significant amounts of contamination internal to equipment (holdup) include the inactive RMC and RMA metal production lines, related ventilation ductwork and filter housings (which are still active), analytical laboratory gloveboxes (both active and inactive) and active Plutonium Process Support Laboratory gloveboxes. Work is ongoing to remove and reconfigure several sections of ductwork directly connected to the RMA and RMC processes, which contain the bulk of the holdup.

In the original design of the PFP complex process facilities, all planned operations and laboratories except waste collection and disposal were provided in the 234-5Z Building. Increases in production, storage and scrap recovery requirements made the following major additions necessary:

1961	Waste Incinerator Facility, 232-Z Building
1964	Plutonium Reclamation Facility, 236-Z Building
1964	Waste Storage and Treatment Facility, 241-Z Building

1980 Vault Storage Facility: 2736-Z, 2736-ZA, 2736-ZB and 2721-Z Buildings

The 232-Z Building is a concrete-block structure, 11 m (37 ft) long by 17 m (57 ft) wide, located just south of 234-5Z Building. It was completed in 1961 and houses an incinerator formerly used to recover plutonium from combustible wastes. The recovered plutonium was recycled through the processing areas at PFP. The incinerator is undergoing deactivation and decommissioning; equipment has been partially dismantled to eliminate most remaining plutonium holdup.

The 236-Z Building is a four-story reinforced concrete structure, 24 m (79 ft) by 22 m (71 ft) by about 15 m (48 ft) high, surmounted at the southwest corner by a two-story penthouse which adds 7 m (22.5 ft) to the building's height. The process cell located in the center of the structure contains many tall, narrow tanks varying in length from 0.8 m (2.5 ft) to about 15 m (50 ft). There is an opening in the south concrete wall of the process cell to the equipment transfer facility (added after initial construction), which allows equipment to be moved directly in and out of the cell from outdoors. The building is linked to the 234-5Z Building by another addition, the 242-Z Building. The facility was started in 1964 to recycle scrap plutonium from RMC processing into a purified plutonium nitrate form suitable for metal production. The primary process was solvent extraction, for which most equipment is in the main process cell. Ancillary processing included dissolution of plutonium solids and filtrate evaporation for dilute solutions. All containers of scrap plutonium which were collected in the late 1980s and temporarily stored in the access gloveboxes have now been removed from the PRF and stabilized via muffle furnaces. Process cell interior surfaces, tankage, access gloveboxes and ancillary gloveboxes still contain a significant amount of plutonium holdup.

The 241-Z Building is a 28-m (92-ft) by 6-m (20-ft) by 6.7-m (22-ft) deep underground reinforced concrete structure with a roof at approximately grade level. There are five separate tank cells, each containing a 5000-gallon tank used to accumulate radioactive wastes for adjustment and transfer to Hanford's underground waste storage tanks. Three of the tanks are active at this time, and the remaining two will await decontamination when the building is deactivated. The 243-Z Building is an active low-level waste treatment facility, added to the PFP complex in 1994. Liquid wastes, primarily cooling water from various systems within the complex, are collected and treated as necessary in this facility before discharge to the Hanford final treatment and discharge plant.

The 2736-Z vault storage facility is an active standalone complex of secure SNM storage vaults and related support equipment with separate ventilation and personnel facilities, located within the PFP complex just south of the 234-Z Building. The 2736-Z Building is a one-story reinforced concrete structure, 20 m (65 ft) long by 17 m (56 ft) wide, containing SNM storage vaults. The 2736-ZA Building is also of reinforced concrete, 12 m (40 ft) by 6.7 m (22 ft), containing exhaust ventilation and filtration equipment for the vaults. The 2736-ZB Building is a concrete structure, 40 meters (132 feet) long by 27 meters (90 feet) wide, used for shipping, receiving, repackaging and non-destructive assay of SNM. The 2721-Z Building is a small structure containing backup electrical power equipment. The storage facility is expected to remain active for the foreseeable future, to safely and securely store SNM. Facility equipment such as storage pedestals and racks will require modification to accommodate stabilized and repackaged SNM in the DOE-STD-3013 packages which comply with DOE-STD-3013-94. Structural modifications are not anticipated, but the ventilation system may require a capacity increase to accommodate the packaging configuration if metal storage is continued and material is received from other DOE locations. The facility contains only minimal amounts of internal equipment contamination, which will be managed during the life of the facility.

200 Area Plutonium Finishing Plant Fuel

Eighty-four grams of 93.2 percent enriched uranium fuel stored at the 2736-ZB Building at the Plutonium Finishing Plant in the 200 West Area of the Hanford Site. The fuel was irradiated at the University of Washington. The fuel is a uranium-aluminum alloy with aluminum cladding. The fuel is contained in a partial assembly of six plates, which are 65.1 centimeters in length, 7.24 centimeters in width and 0.18 centimeters in thickness. The six fuel plates are stored in one 55 gallon drum. The fuel has had very little exposure; its burnup is effectively zero, with surface dose rates of 0.3 mr/hr gamma and 0.8 mr/hr beta plus gamma.

There are 7.8 kilograms of plutonium fuel from the LAMPRE at Los Alamos National Laboratory stored in three EBR II casks within the yard area at PFP. The casks are located within a protective concrete structure.

200 West Area Low-Level Burial Ground

There are 17.2 kilograms of uranium from the TRIGA at Oregon State University stored at the 200 Area Low Level Burial Grounds. The uranium hydride fuel in the TRIGA fuel element is mixed with zirconium hydride (8.5% uranium and 91.5% zirconium). Six or seven of the aluminum clad fuel assemblies are contained in each of 13 lead-lined 55 gallon drums. The average weight of the drums is 1,043 kilograms. Overall dimensions of the TRIGA fuel elements are 3.73 centimeters (1.47 inches) in outside diameter and 72.1 centimeters (28.4 inches) in length. The fuel was received at Hanford during 1987 and is covered with soil in Trench 7 in 218-W-4C.

The 218-W-4C Burial Ground contains trenches with flat, gravel bottoms, and with asphalt bottoms. The 218-W-4C Burial Ground holds the 13 lead-lined 55 gallon drums in trench 7, covered with at least four feet of soil.

The current storage container, called the TRIGA® Standard Fuel Element Storage Drum is composed of three layers. The outside skin is made from a 17C DOT Specification Container, 49 CFR 178.115, sometimes called a 55-gallon drum. The intermediate container is a carbon steel, 14-inch diameter, schedule 80 pipe section, with a bottom welded closure and a top bolted closure. Normal weight concrete is poured between these two containers. The third and inner container is a 5-inch diameter, schedule 40 pipe. The void between the two pipes is filled with lead shot with lead castings top and bottom.

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Revision 5
Volume 2

DNFSB Recommendation 94-1 Hanford Site Integrated Stabilization Management Plan

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Assistant Secretary for Environmental Management

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DNFSB RECOMMENDATION 94-1
HANFORD SITE INTEGRATED STABILIZATION MANAGEMENT PLAN
VOLUME 2: SCHEDULES

EXECUTIVE SUMMARY

The Hanford Site Integrated Stabilization Management Plan (SISMP) was developed in support of the U.S. Department of Energy's (DOE) Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 Integrated Program Plan (IPP). Volume 1 of the SISMP identifies the technical scope and costs associated with Hanford Site plans to resolve concerns identified in DNFSB Recommendation 94-1. Volume 2 of the SISMP provides the Resource Loaded Integrated Schedules for Spent Nuclear Fuel Project and Plutonium Finishing Plant activities identified in Volume 1 of the SISMP.

Appendix A provides the schedules and progress curves related to spent nuclear fuel management. Appendix B provides the schedules and progress curves related to plutonium-bearing material management.

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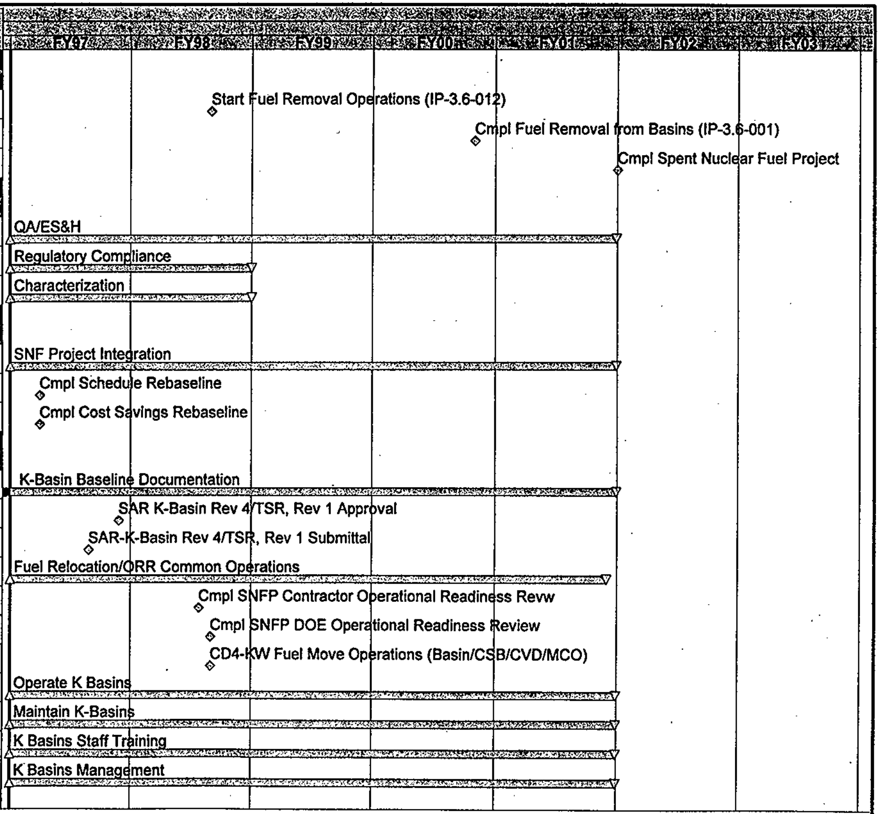
APPENDIX A

HANFORD SITE SPENT NUCLEAR FUEL SCHEDULES

Early Start	Early finish	
SNF PROJECT MILESTONES		
SPENT NUCLEAR FUEL		
31MAY98*		Start Fuel Removal Operations (IP-3.6-012)
	31JUL00	Cmpl Fuel Removal from Basins (IP-3.6-001)
	30SEP01*	Cmpl Spent Nuclear Fuel Project
SAFETY & QUALITY		
QA/ES&H/Characterization		
01OCT96	28SEP01	QA/ES&H
01OCT96	30SEP98	Regulatory Compliance
01OCT96	30SEP98	Characterization
PROJECT INTEGRATION		
Project Integration		
01OCT96	28SEP01	SNF Project Integration
	31DEC96*	Cmpl Schedule Rebaseline
	31DEC96*	Cmpl Cost Savings Rebaseline
OPERATIONS		
K Basins Operations & Maintenance		
03SEP96A	28SEP01	K-Basin Baseline Documentation
	27AUG97	SAR K-Basin Rev 4/TSR, Rev 1 Approval
	27MAY97	SAR-K-Basin Rev 4/TSR, Rev 1 Submittal
01OCT96	30AUG01	Fuel Relocation/ORR Common Operations
	24APR98	Cmpl SNFP Contractor Operational Readiness Revw
	29MAY98	Cmpl SNFP DOE Operational Readiness Review
30MAY98		CD4-KW Fuel Move Operations (Basin/CSB/CVD/MCO)
01OCT96	28SEP01	Operate K Basins
01OCT96	28SEP01	Maintain K-Basins
01OCT96	28SEP01	K Basins Staff Training
01OCT96	28SEP01	K Basins Management
FRS Operations		



Project Start 01OCT92
Project Finish 02OCT17
Data Date 01OCT96
Plot Date 16APR97
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Spent Nuclear Fuels Project
Enhanced Baseline
Level 2 Schedule

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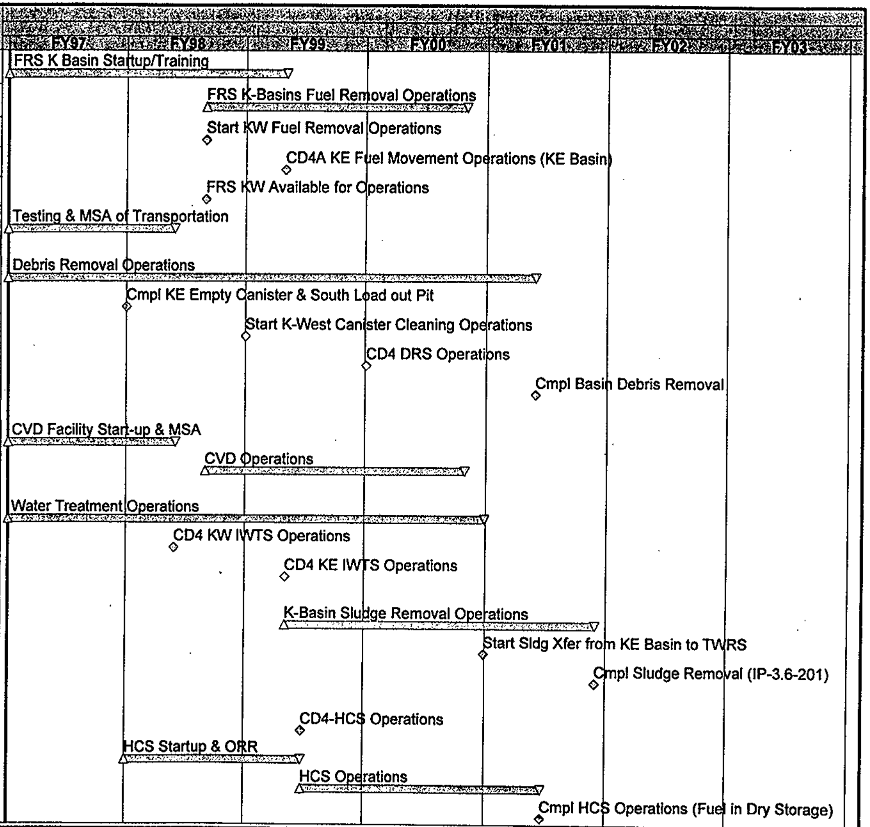
Early Start	Early finish	
01OCT96	29JAN99	FRS K Basin Startup/Training
30MAY98	31JUL00	FRS K-Basins Fuel Removal Operations
30MAY98		Start KW Fuel Removal Operations
	28JAN99	CD4A KE Fuel Movement Operations (KE Basin)
30MAY98		FRS KW Available for Operations
01OCT96	27FEB98	Testing & MSA of Transportation
Debris Removal Operations		
01OCT96	26FEB01	Debris Removal Operations
	30SEP97	Cmpl KE Empty Canister & South Load out Pit
01OCT98		Start K-West Canister Cleaning Operations
04OCT99*		CD4 DRS Operations
	26FEB01	Cmpl Basin Debris Removal
CVD Operations		
01OCT96	02MAR98	CVD Facility Start-up & MSA
01JUN98	28JUL00	CVD Operations
Water Treatment Operations		
01OCT96	29SEP00	Water Treatment Operations
	26FEB98	CD4 KW IWTS Operations
	29JAN99	CD4 KE IWTS Operations
Sludge Removal Operations		
01FEB99	30AUG01	K-Basin Sludge Removal Operations
29SEP00		Start Sldg Xfer from KE Basin to TWRS
	30AUG01	Cmpl Sludge Removal (IP-3.6-201)
Hot Conditioning Operations		
	23MAR99	CD4-HCS Operations
01OCT97	23MAR99	HCS Startup & ORR
24MAR99	22MAR01	HCS Operations
	22MAR01	Cmpl HCS Operations (Fuel in Dry Storage)



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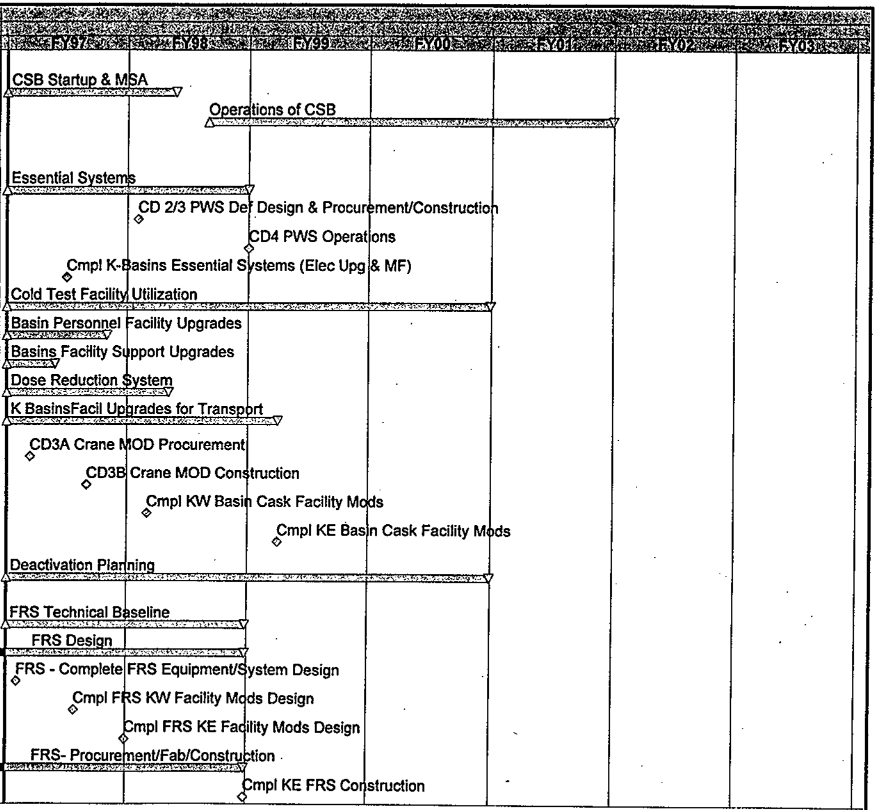
Early Start	Early finish	
CSB Operations		
01OCT96	23FEB98	CSB Startup & MSA
01JUN98	28SEP01	Operations of CSB
FACILITY PROJECTS		
Facility Upgrades		
01OCT96	30SEP98	Essential Systems
	31OCT97*	CD 2/3 PWS Def Design & Procurement/Construction
	30SEP98	CD4 PWS Operations
	31MAR97*	Cmpl K-Basins Essential Systems (Elec Upg & MF)
01OCT96	29SEP00	Cold Test Facility Utilization
01OCT96	31JUL97	Basin Personnel Facility Upgrades
01OCT96	24FEB97	Basins Facility Support Upgrades
01OCT96	02FEB98	Dose Reduction System
01OCT96	30DEC98	K BasinsFacil Upgrades for Transport
	09DEC96*	CD3A Crane MOD Procurement
02JUN97*		CD3B Crane MOD Construction
	30NOV97*	Cmpl KW Basin Cask Facility Mods
	30DEC98	Cmpl KE Basin Cask Facility Mods
01OCT96	29SEP00	Deactivation Planning
Fuel Retrieval System		
01OCT96	24SEP98	FRS Technical Baseline
30APR96A	24SEP98	FRS Design
	01NOV96	FRS - Complete FRS Equipment/System Design
	25APR97	Cmpl FRS KW Facility Mods Design
	26SEP97	Cmpl FRS KE Facility Mods Design
15JUL96A	24SEP98	FRS- Procurement/Fab/Construction
	24SEP98	Cmpl KE FRS Construction



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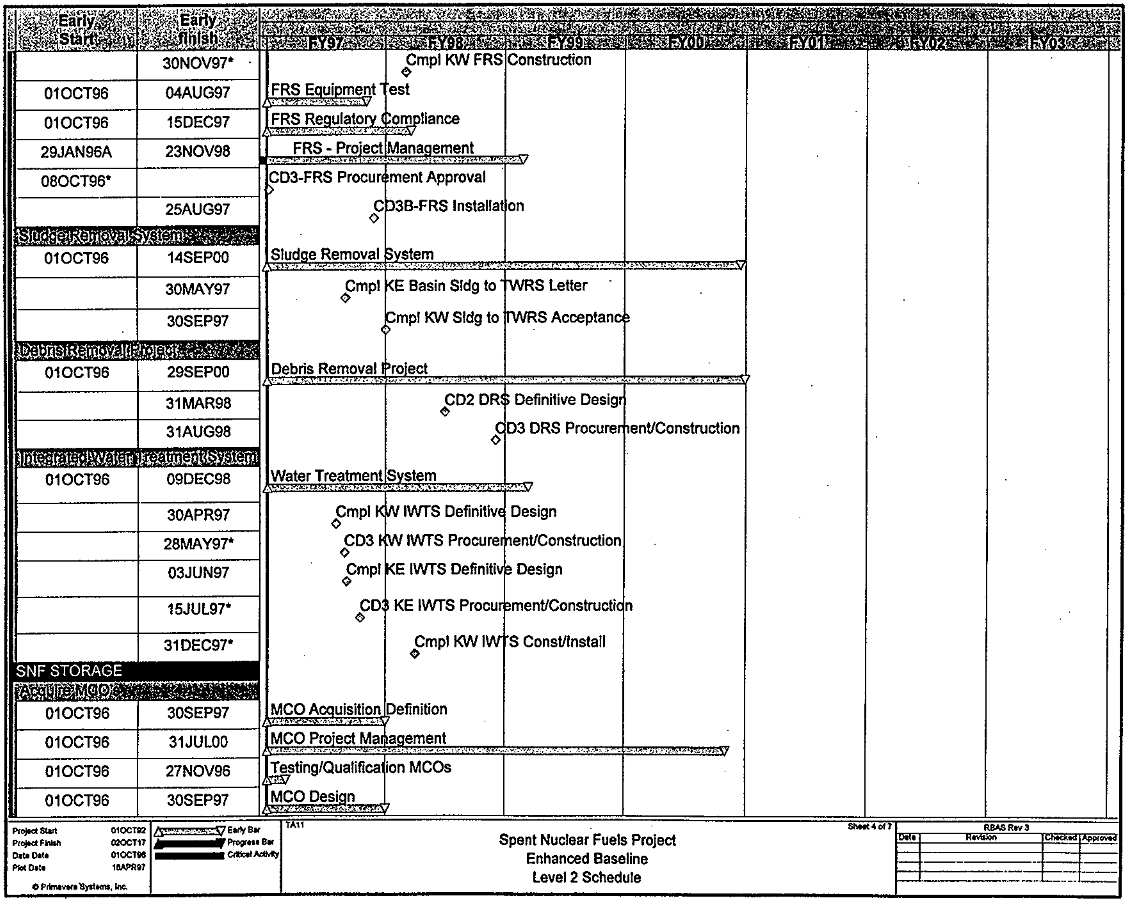

Early Start	Early finish	
	30NOV97*	Cmpl KW FRS Construction
01OCT96	04AUG97	FRS Equipment Test
01OCT96	15DEC97	FRS Regulatory Compliance
29JAN96A	23NOV98	FRS - Project Management
08OCT96*		CD3-FRS Procurement Approval
	25AUG97	CD3B-FRS Installation
Sludge Removal System		
01OCT96	14SEP00	Sludge Removal System
	30MAY97	Cmpl KE Basin Sldg to TWRS Letter
	30SEP97	Cmpl KW Sldg to TWRS Acceptance
Debris Removal Project		
01OCT96	29SEP00	Debris Removal Project
	31MAR98	CD2 DRS Definitive Design
	31AUG98	CD3 DRS Procurement/Construction
Integrated Water Treatment System		
01OCT96	09DEC98	Water Treatment System
	30APR97	Cmpl KW IWTS Definitive Design
	28MAY97*	CD3 KW IWTS Procurement/Construction
	03JUN97	Cmpl KE IWTS Definitive Design
	15JUL97*	CD3 KE IWTS Procurement/Construction
	31DEC97*	Cmpl KW IWTS Const/Install
SNF STORAGE		
Acquire MCO		
01OCT96	30SEP97	MCO Acquisition Definition
01OCT96	31JUL00	MCO Project Management
01OCT96	27NOV96	Testing/Qualification MCOs
01OCT96	30SEP97	MCO Design

Project Start	01OCT92
Project Finish	02OCT17
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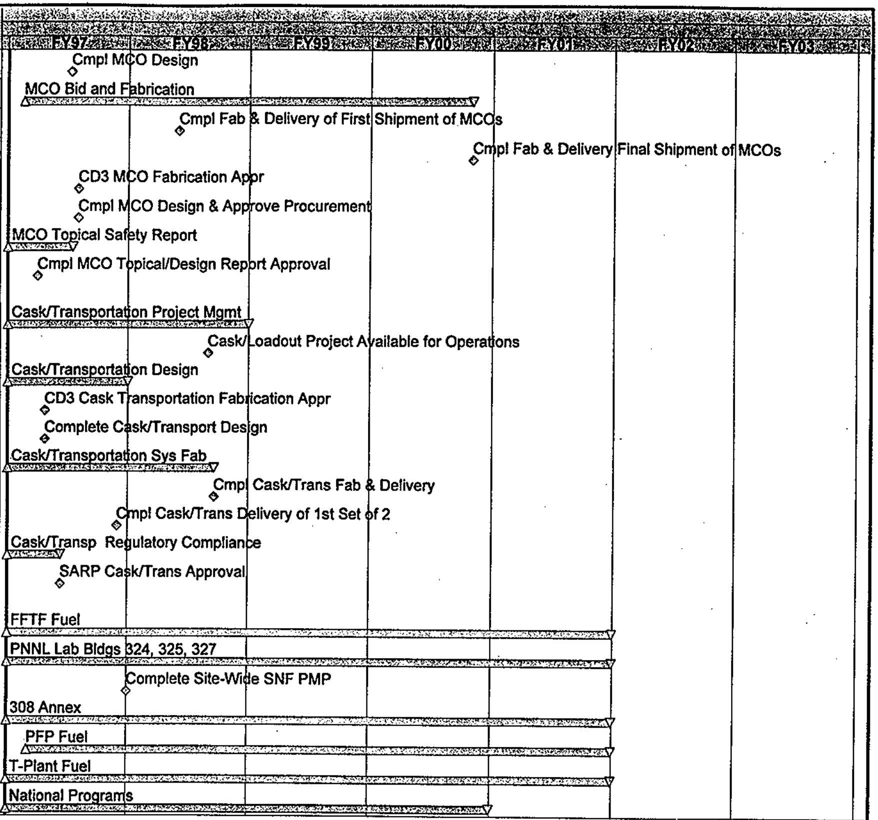

Early Start	Early finish	
	08APR97	Cmpl MCO Design
18NOV96	31JUL00	MCO Bid and Fabrication
	02MAR98	Cmpl Fab & Delivery of First Shipment of MCOs
	31JUL00	Cmpl Fab & Delivery Final Shipment of MCOs
	30APR97	CD3 MCO Fabrication Appr
01MAY97		Cmpl MCO Design & Approve Procurement
01OCT96	14APR97	MCO Topical Safety Report
	30DEC96	Cmpl MCO Topical/Design Report Approval
Cask/Transportation System		
01OCT96	30SEP98	Cask/Transportation Project Mgmt
	29MAY98	Cask/Loadout Project Available for Operations
01OCT96	30SEP97	Cask/Transportation Design
	22JAN97*	CD3 Cask Transportation Fabrication Appr
	22JAN97*	Complete Cask/Transport Design
01OCT96	19JUN98	Cask/Transportation Sys Fab
	19JUN98	Cmpl Cask/Trans Fab & Delivery
	28AUG97	Cmpl Cask/Trans Delivery of 1st Set of 2
01OCT96	11MAR97	Cask/Transp Regulatory Compliance
	11MAR97	SARP Cask/Trans Approval
Other Hanford Fuels		
01OCT96	28SEP01	FFTF Fuel
01OCT96	28SEP01	PNNL Lab Bldgs 324, 325, 327
	30SEP97	Complete Site-Wide SNF PMP
01OCT96	28SEP01	308 Annex
02DEC96	28SEP01	PFP Fuel
01OCT96	28SEP01	T-Plant Fuel
01OCT96	29SEP00	National Programs

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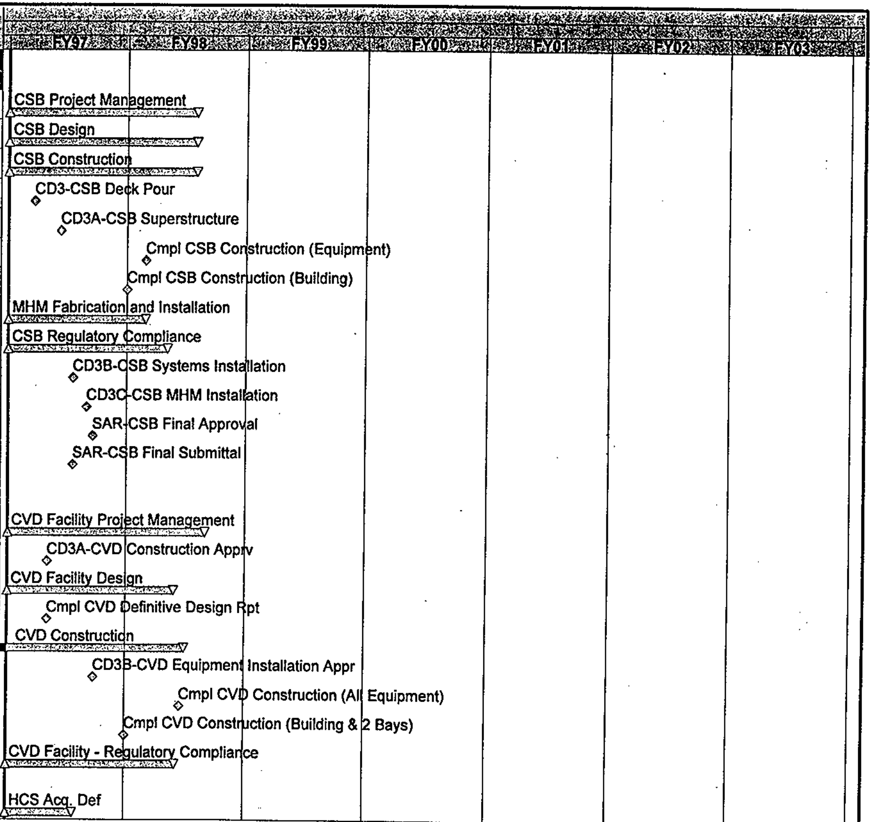
Early Start	Early finish	
CANISTER STORAGE BUILDING		
CSB Facility		
01OCT96	30APR98	CSB Project Management
01OCT96	30APR98	CSB Design
01OCT96	30APR98	CSB Construction
20DEC96*		CD3-CSB Deck Pour
	10MAR97*	CD3A-CSB Superstructure
	26NOV97	Cmpl CSB Construction (Equipment)
	30SEP97*	Cmpl CSB Construction (Building)
01OCT96	26NOV97	MHM Fabrication and Installation
01OCT96	02FEB98	CSB Regulatory Compliance
21APR97		CD3B-CSB Systems Installation
30MAY97*		CD3C-CSB MHM Installation
	20JUN97	SAR-CSB Final Approval
	18APR97	SAR-CSB Final Submittal
CONDITIONING PROJECTS		
Cold Vacuum Drying		
01OCT96	29MAY98	CVD Facility Project Management
	31JAN97	CD3A-CVD Construction Apprv
01OCT96	26FEB98	CVD Facility Design
	31JAN97	Cmpl CVD Definitive Design Rpt
01AUG96A	31MAR98	CVD Construction
27JUN97*		CD3B-CVD Equipment Installation Appr
	17MAR98	Cmpl CVD Construction (All Equipment)
	30SEP97*	Cmpl CVD Construction (Building & 2 Bays)
01OCT96	05MAR98	CVD Facility - Regulatory Compliance
Hot Conditioning System		
01OCT96	25APR97	HCS Acq. Def



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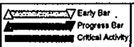
Project Finish	02OCT17
Data Date	01OCT96
Plot Date	18APR97



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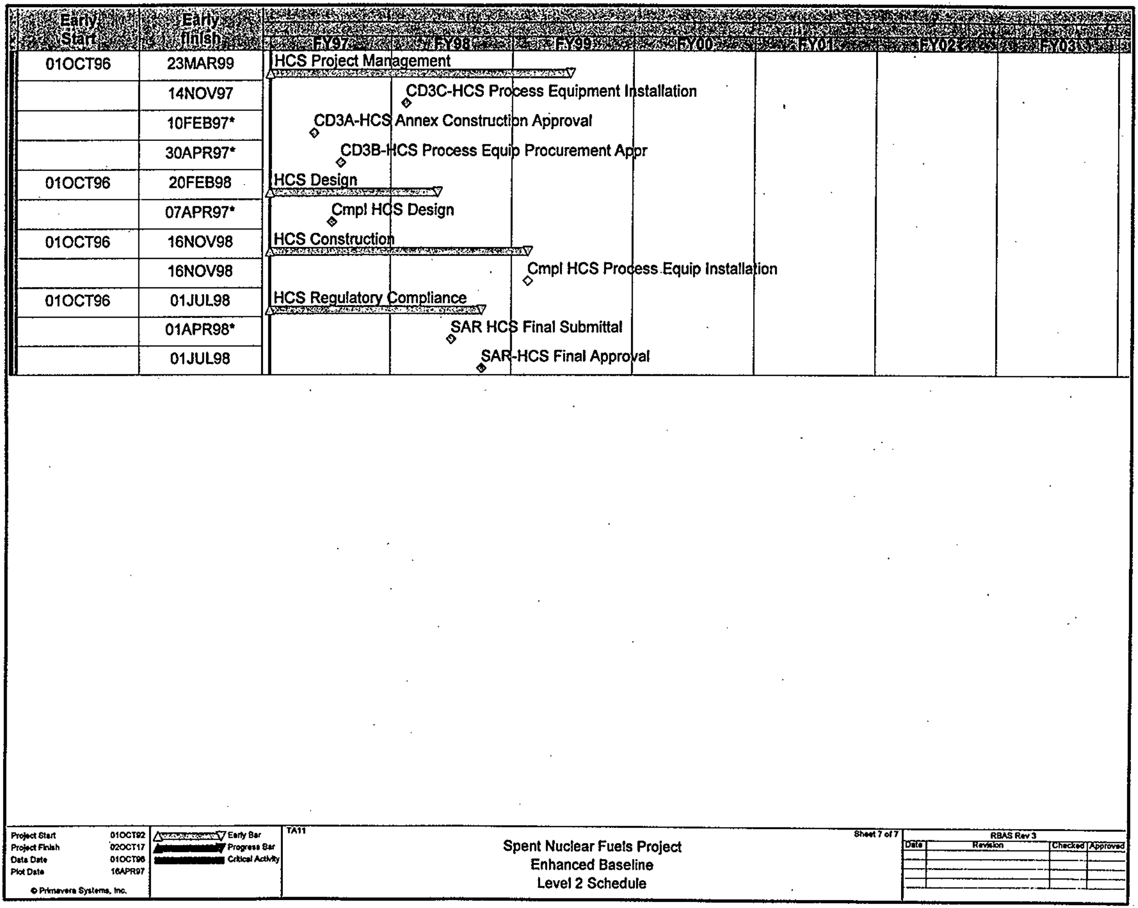

Early Start	Early finish	
01OCT96	23MAR99	HCS Project Management
	14NOV97	CD3C-HCS Process Equipment Installation
	10FEB97*	CD3A-HCS Annex Construction Approval
	30APR97*	CD3B-HCS Process Equip Procurement Appr
01OCT96	20FEB98	HCS Design
	07APR97*	Cmpl HCS Design
01OCT96	16NOV98	HCS Construction
	16NOV98	Cmpl HCS Process Equip Installation
01OCT96	01JUL98	HCS Regulatory Compliance
	01APR98*	SAR HCS Final Submittal
	01JUL98	SAR-HCS Final Approval

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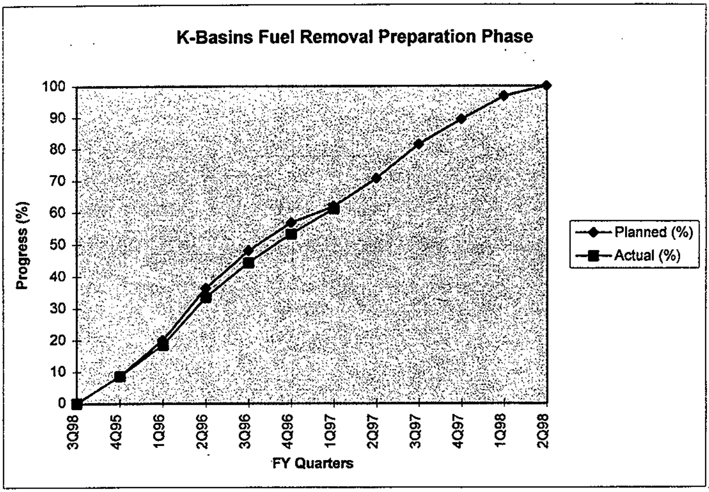
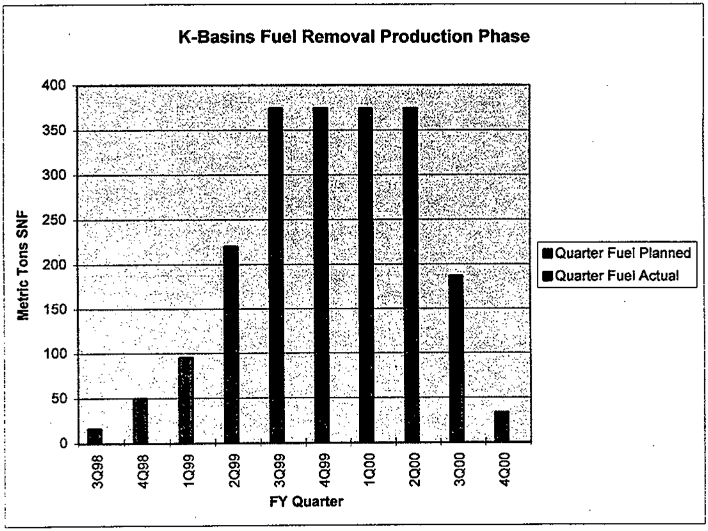
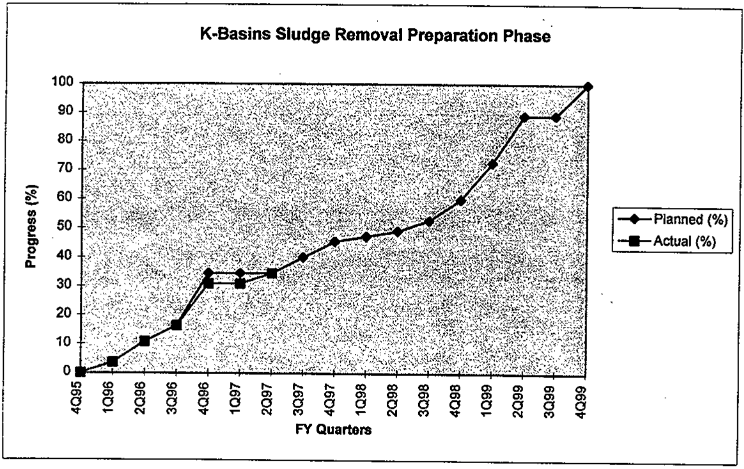
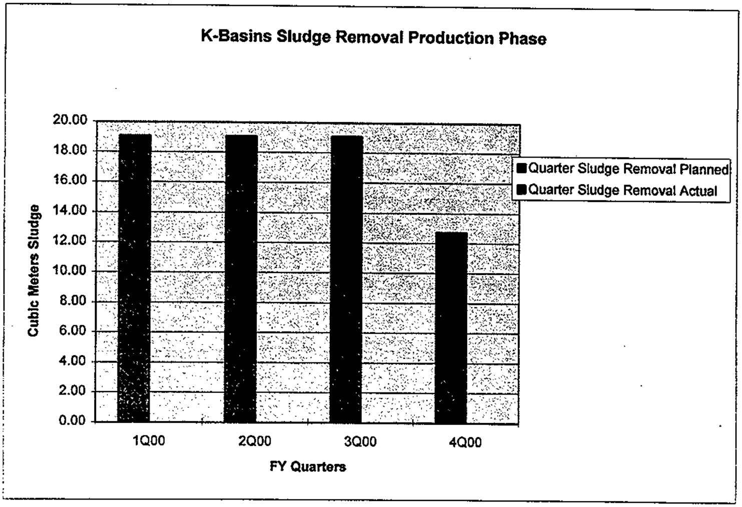

K-Basins Fuel Removal Preparation Phase
Progress (%)
100
90
80
70
60
50
40
30
20
10
0
3Q98
4Q95
1Q96
2Q96
3Q96
4Q96
1Q97
2Q97
3Q97
4Q97
1Q98
2Q98
FY Quarters
Planned (%)
Actual (%)


K-Basins Fuel Removal Production Phase
Metric Tons SNF
400
350
300
250
200
150
100
50
0
3Q98
4Q98
1Q99
2Q99
3Q99
4Q99
1Q00
2Q00
3Q00
4Q00
FY Quarter
Quarter Fuel Planned
Quarter Fuel Actual


K-Basins Sludge Removal Preparation Phase
Progress (%)
100
90
80
70
60
50
40
30
20
10
0
4Q95
1Q96
2Q96
3Q96
4Q96
1Q97
2Q97
3Q97
4Q97
1Q98
2Q98
3Q98
4Q98
1Q99
2Q99
3Q99
4Q99
FY Quarters
Planned (%)
Actual (%)


K-Basins Sludge Removal Production Phase
Cubic Meters Sludge
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1Q00
2Q00
3Q00
4Q00
FY Quarters
Quarter Sludge Removal Planned
Quarter Sludge Removal Actual

APPENDIX B

PLUTONIUM-BEARING MATERIALS SCHEDULES

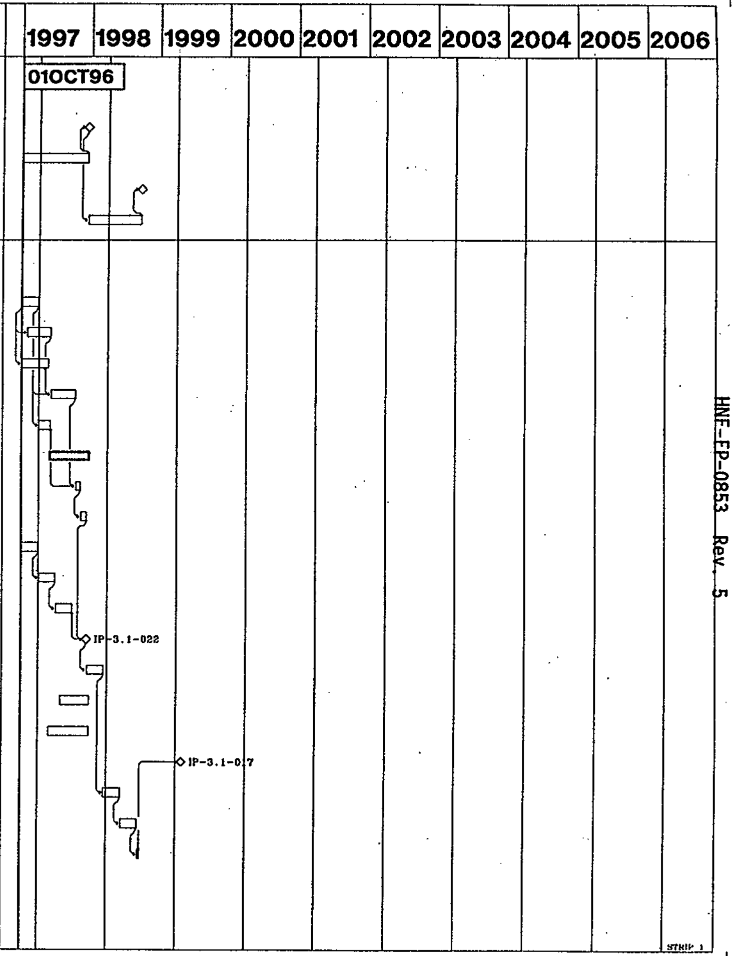
PLUTONIUM SOLUTIONS

Plutonium Solutions Processing

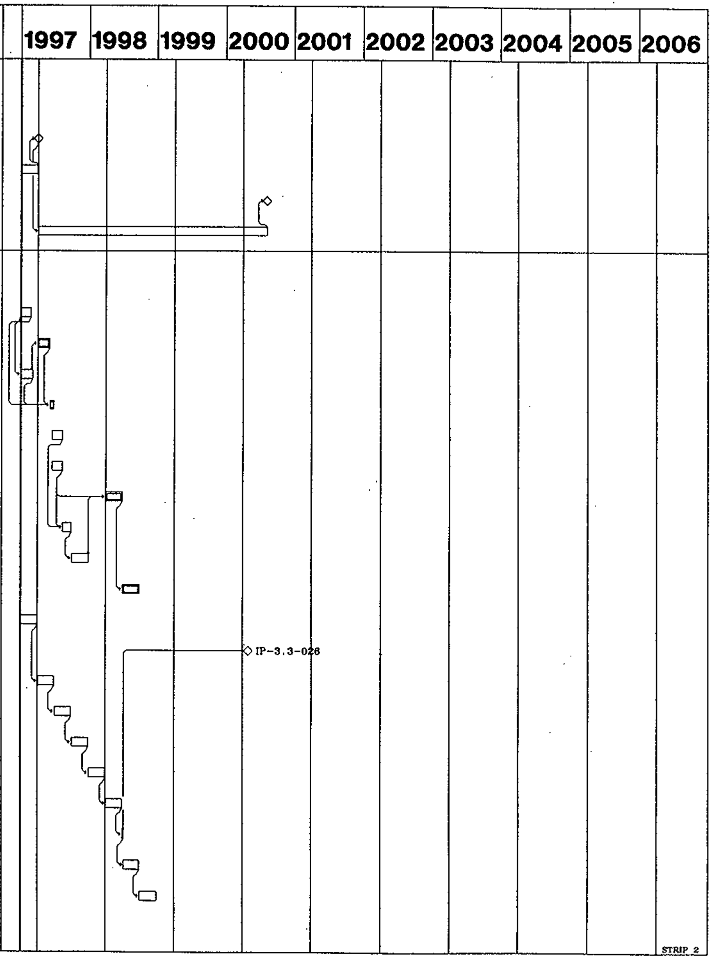
ACTIVITY ID	Description	E_Start E_Finish
IP31022A	Begin Processing Solutions	09/15/97 09/15/97
IP31022A	Preparation Phase	10/01/96 09/15/97
IP31017A	Processing Completed	06/24/98 06/24/98
IP31017A	Production Phase	09/16/97 06/24/98

...Solution Stabilization

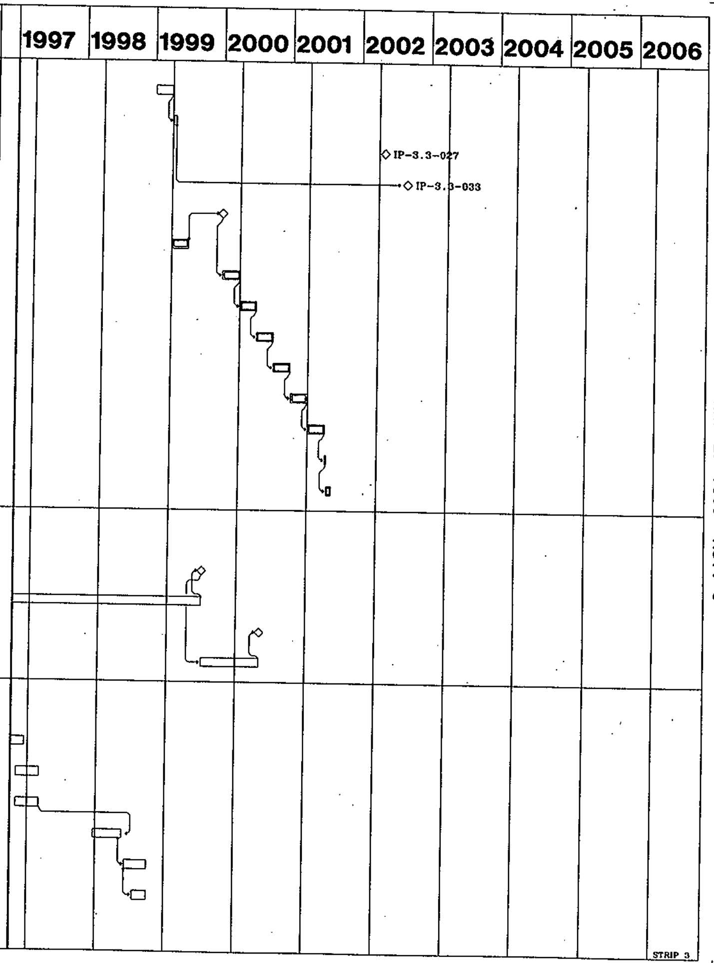
ACTIVITY ID	Description	E_Start E_Finish
IP31022D	Design - Vertical Calciner	10/01/96 12/30/96
IP31022F	Fabrication - Vertical Calciner	10/31/96 03/05/97
IP31022G	Procurement - Vertical Calciner	10/01/96 02/20/97
IP31022J	Installation - Vertical Calciner	03/06/97 07/16/97
IP31022K	Procedure Development for Vertical Calciner	12/31/96 03/04/97
IP31022L	Training - Vertical Calciner	02/24/97 09/30/97
IP31022L	Training - Vertical Calciner	07/17/97 08/12/97
IP31022N	Operational Readiness Assessment	08/13/97 09/15/97
IP31022M	Perform 6 Tests - 1st Qtr	10/01/96 12/31/96
IP31022M	Perform 6 Tests - 2nd Qtr	01/02/97 03/31/97
IP31022M	Perform 6 Tests - 3rd Qtr	04/01/97 06/30/97
IP31022	M\S-M- BEGIN PROCESSING SOLUTIONS 6/30/97	09/15/97 09/15/97
IP31022A	Process 1058 liters of Sol - 4th Qtr	09/16/97 12/15/97
IP31022A	Solutions Training	04/28/97 09/30/97
IP31022A	Training for Solution Stabilization	02/24/97 09/30/97
IP31017	M\S-M-COMP STAB OF ALL Pu SOLUTIONS 1/31/99	01/31/99 01/31/99
IP31017B	Process 1525 liters of Sol - 1st Qtr	12/16/97 03/17/98
IP31017B	Process 1525 liters of Sol - 2nd Qtr	03/18/98 06/12/98
IP31017B	Process 192 liters of Sol - 3rd Qtr	06/15/98 06/24/98



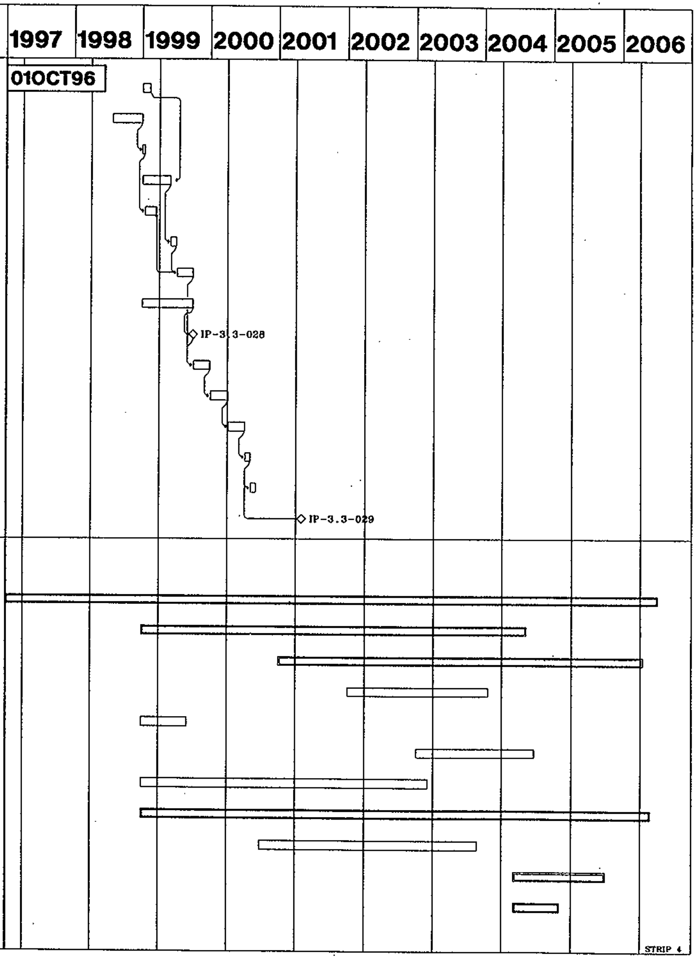
ACTIVITY ID	Description	E_Start E_Finish
PLUTONIUM RESIDUES & MIXED OXIDES <50% ASSAY		
Pu Residue/Mixed Oxides <50% - New Furnaces		
IP33033A	Preparation Phase Complete	12/31/96 12/31/96
IP33033B	Preparation Phase	10/01/96 12/31/96
IP33033C	Production Phase Complete	05/08/00 05/08/00
IP33033D	Production Phase	01/02/97 05/08/00
...Residue Stabilization		
IP33033R	Security Upgrades	10/01/96 11/25/96
IP33033T	Complete Installation of Equipment	12/30/96 03/06/97
IP33033T	Install Equipment	10/01/96 12/04/96
IP33033X	Perform operational readiness assessment	03/07/97 03/28/97
IP33033E	Develop blend plan for oxide stabilization	03/17/97 05/13/97
IP33033F	Prepare/issue OSD/OCD	03/17/97 05/13/97
IP33033W	Oxide testing, 2nd Qtr	12/29/97 03/31/98
IP33033W	Oxide testing, 3rd Qtr	05/14/97 06/30/97
IP33033W	Oxide testing, 4th Qtr	07/01/97 09/30/97
IP33033W	Oxide testing, 3rd Qtr	04/01/98 06/30/98
IP33026A	Cement 341 kgs, 1st Qtr	10/01/96 12/31/96
IP33026	M\S-M-COMP STAB REACTIVE SOLID RESIDUES 1/31	01/31/00 01/31/00
IP33026A	Cement 409 kgs, 2nd Qtr	01/02/97 03/31/97
IP33026A	Cement 423 kgs, 3rd Qtr	04/01/97 06/30/97
IP33026A	Cement 416 kgs, 4th Qtr	07/01/97 09/30/97
IP33026A	Cement 409 kgs, 1st Qtr	10/01/97 12/31/97
IP33026A	Cement 409 kgs, 2nd Qtr	01/02/98 03/31/98
IP33026A	Cement 59 kgs, 3rd Qtr	04/01/98 04/07/98
IP33026A	Cement 407 kgs, 3rd Qtr	04/08/98 06/30/98
IP33026A	Cement 436 kgs, 4th Qtr	07/01/98 09/30/98



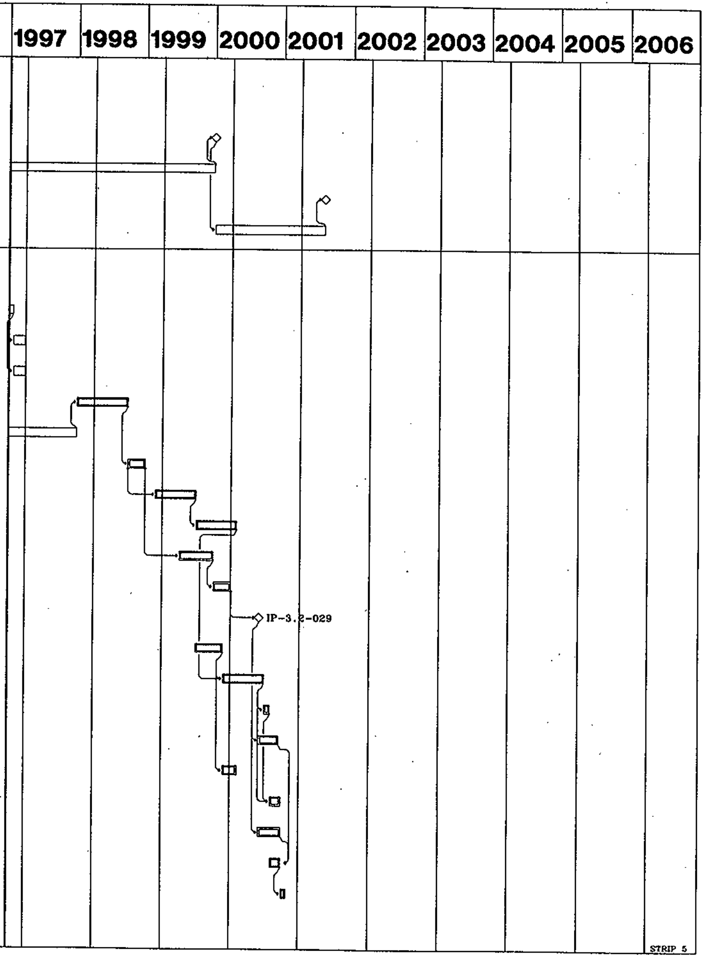
ACTIVITY ID	Description	E_Start E_Finish
IP33026A	Cement 429 kgs, 1st Qtr	10/01/98 12/31/98
IP33026A	Cement 69 kgs, 2nd Qtr	01/04/99 01/18/99
IP33027-	M\S-M-COMP STAB & REPACKAGE RESIDUES 1/31/02	01/31/02 01/31/02
IP33033	M\S-M-COMP STAB/PACKAGE OF ALL RESIDUES 5/31	05/31/02 05/31/02
IP33033Z	M/S-K-CMP STAB 1215 KG HIGH ASSAY OXIDES 9/30	09/30/99 09/30/99
IP33033Z	Stabilize 418 kg oxide 4th Qtr	01/04/99 04/01/99
IP33033Z	Oxide Stabilization 411 kgs, 1st Qtr	09/30/99 01/03/00
IP33033Z	Oxide Stabilization 411 kgs, 2nd Qtr	01/04/00 03/30/00
IP33033Z	Oxide Stabilization 425 kgs, 3rd Qtr	03/31/00 06/29/00
IP33033Z	Stabilize 418 kg oxide, 4th Qtr	06/30/00 09/29/00
IP33033Z	Oxide Stabilization 404 kgs, 1st Qtr	10/02/00 12/29/00
IP33033Z	Oxide Stabilization 425 kgs, 2nd Qtr	01/02/01 04/02/01
IP33033Z	Stabilize 6 kgs TCO/24 kg oxide, 3rd Qtr	04/03/01 04/10/01
IP33033Z	Post operation cleanup	04/11/01 05/08/01
Pu Residue/Mixed Oxides <50% - Polycubes		
IP33028A	Preparation Phase Complete	07/01/99 07/01/99
IP33028B	Preparation Phase	10/01/96 07/01/99
IP33029A	Production Phase Complete	05/03/00 05/03/00
IP33029B	Production Phase	07/02/99 05/03/00
Pyrolysis Furnaces (For Polycubes)		
IP33028C	Engineering Study	10/01/96 12/12/96
IP33028C	Fabricate/Burn in Prototype	10/31/96 03/04/97
IP33028G	Site Location/ Utilities	10/31/96 03/04/97
IP33028E	Safety Review (CSER)	12/19/97 05/20/98
IP33028C	Definitive Design	06/04/98 09/30/98
IP33028F	Procurement	07/16/98 09/30/98



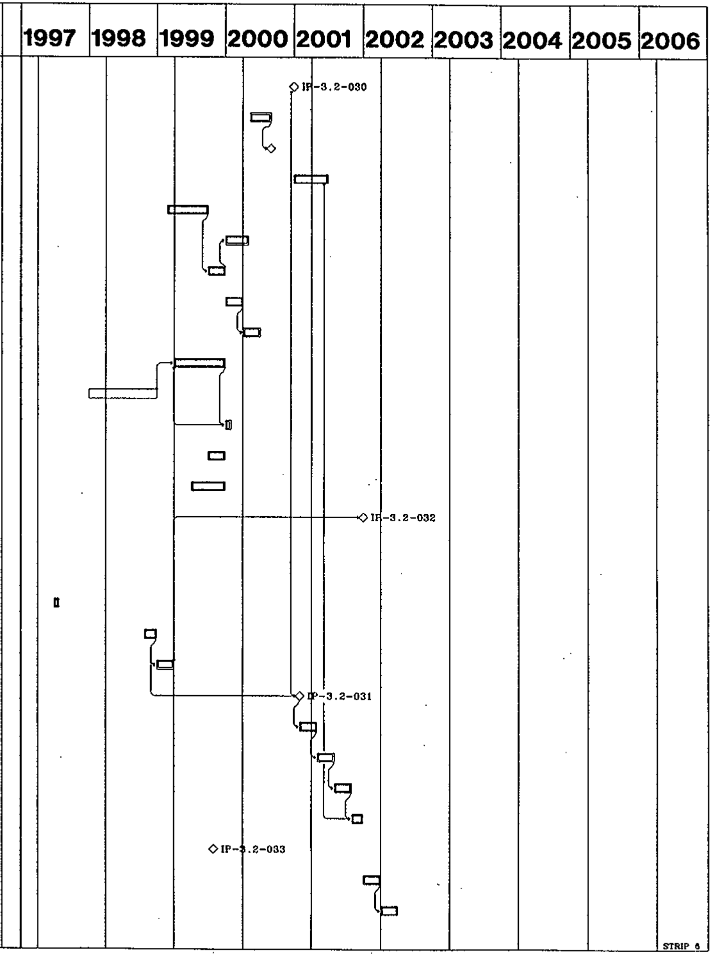
ACTIVITY ID	Description	E_Start E_Finish
IP33028F	Procurement	10/01/98 11/11/98
IP33028J	Procedures	04/22/98 09/30/98
IP33028J	Procedures	10/01/98 10/14/98
IP33028C	Construction	10/01/98 03/02/99
IP33028K	Training Development	10/15/98 12/15/98
IP33028L	OTP	03/03/99 04/02/99
IP33028K	Training	04/05/99 07/01/99
IP33028C	Readiness Assessment	10/01/98 07/01/99
IP33028	M/S-M-START STABILIZATION OF POLYCUBES 7/31/	07/01/99 07/01/99
IP33028C	Stabilize 340 Cubes - 4th	07/02/99 09/30/99
IP33028C	Stabilize 560 Cubes - 1st	10/01/99 01/05/00
IP33028C	Stabilize 560 Cubes - 2nd	01/06/00 04/04/00
IP33028C	Stabilize 140 Cubes - 3rd	04/05/00 05/03/00
IP33028C	Post operation clean up	05/04/00 06/02/00
IP33029	M/S-M-CMPLT STABILIZATION OF POLYCUBES 1/31/	01/31/01 01/31/01
...Facility Cleanout		
	234-5Z CLEANUP AND TRANSITION	10/01/96 04/03/06
	236-Z BUILDING CLEANUP	10/01/98 05/11/04
	242-Z CLEANUP AND TRANSITION	10/02/00 01/13/06
	241-Z CLEANUP AND TRANSITION	10/01/01 10/21/03
	241-Z-RB CLEANUP AND TRANSITION	10/01/98 06/02/99
	241-Z-361 CLEANUP AND TRANSITION	10/01/02 06/23/04
	231-Z CELLS 3 - 6 CLEANUP AND TRANSITION	10/01/98 12/03/02
	291-Z CLEANUP AND TRANSITION	10/01/98 02/21/06
	216-Z-9 MINING FACILITY CLEANUP AND TRANSITI	06/26/00 08/26/03
	243-Z/ZA/ZB CLEANUP AND TRANSITION	03/05/04 07/01/05
	MISC BUILDINGS CLEANUP AND TRANSITION	03/05/04 11/03/04



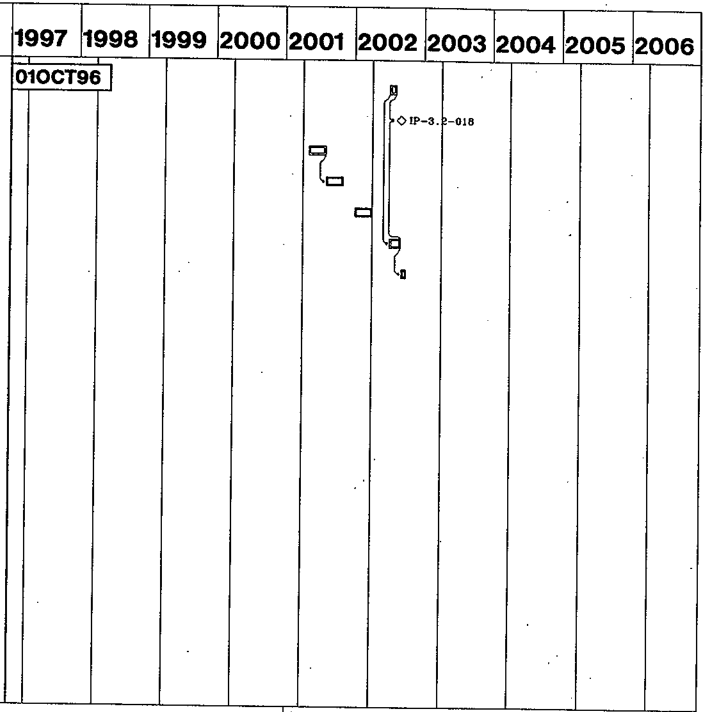
ACTIVITY ID	Description	E_Start E_Finish
PLUTONIUM METAL & OXIDES >50% ASSAY		
...Processing Oxides >50% Assay		
IP32030A	Preparation Phase Complete	09/30/99 09/30/99
IP32030B	Preparation Phase	10/01/96 09/30/99
IP33030C	Production Phase Complete	05/04/01 05/04/01
IP32018A	Production Phase	10/01/99 05/04/01
...Pu Stabilization & Packaging		
IP32032	Complete process tests	10/01/96 10/23/96
IP32032	Develop blend plan for metal stabilization	10/24/96 12/31/96
IP32032	Prepare/issue OSD/OCD	10/24/96 12/31/96
IP32029C	Design Activities for PuSAP	10/01/97 06/30/98
IP32029C	Design Activities for PuSAP	10/01/96 09/30/97
IP32029C	Design Activities for PuSAP	07/01/98 09/30/98
IP32029C	Design Vault Prep/Security Mods (Vault 2)	11/25/98 06/30/99
IP32029C	Security Modifications (Vault 4)	07/01/99 02/01/00
IP32029-	Site Prep/Construction /Installation of PuSAP	04/02/99 09/30/99
IP32029-	Site Prep/Construction /Installation of PuSAP	10/01/99 01/03/00
IP32029	M\S-M- COMP INSTALLATION OF PuSAP 06/01/00	06/01/00 06/01/00
IP32029	Vault Preparation/Security Mods (Vault 2)	07/01/99 11/23/99
IP32029	Vault Preparation/Security Mods (Vault 4)	11/24/99 06/29/00
IP32029	Vault Preparation/Security Mods (Vault 4)	06/30/00 08/01/00
IP32030C	ATP/OTP of PuSAP	06/01/00 09/14/00
IP32029	ATP/OTP of Security Modifications (Vault 2)	11/24/99 02/09/00
IP32029	ATP/OTP of Security Modifications (Vault 4)	08/02/00 09/27/00
IP32030A	Procedure Development for PuSAP	06/01/00 09/29/00
IP32030A	Testing Startup for PuSAP	08/04/00 09/29/00
IP32030A	Testing & Readiness Review Startup for PuSAP	10/02/00 10/27/00



ACTIVITY ID	Description	E_Start E_Finish
IP32030	M\S-M- COMP ORR FOR PuSAP 9/30/00	09/29/00 09/29/00
IP32029	Test & Read Rvw Startup for Sec Mods (Vault	02/10/00 06/01/00
IP32029	M/S-K-COMP MODS TO ONE VAULT FOR PuSAP 6/01/0	06/01/00 06/01/00
IP32029	Test & Read Rvw Startup for Sec Mods (Vault	09/28/00 03/30/01
IP32029	Design Vault Prep/Security Mods (Vault 2)	11/25/98 06/30/99
IP32029	Security Modifications (Vault 4)	10/01/99 02/01/00
IP32029	Security Modifications (Vault 4)	07/01/99 09/30/99
IP32030B	PuSH, 2nd Qtr (Training)	10/01/99 01/03/00
IP32030B	PuSH, 3rd Qtr (Training)	01/04/00 04/03/00
IP32029	Procurement of PuSAP	12/30/98 09/30/99
IP32029	Procurement of PuSAP	10/01/97 09/30/98
IP32029	Procurement of PuSAP	10/01/99 11/01/99
IP32029	Procurement of Security Equipment	07/01/99 09/29/99
IP32029	Site Prep/Construction /Installation of PuSAP	04/02/99 09/30/99
IP32032	M\S-M- COMP METAL REPACKAGING AT PFP - 9/30/	09/30/01 09/30/01
IP32032	Stabilize 12 kgs (APR ONLY) 2nd Qtr	03/31/97 04/25/97
IP32032	Stabilize 535 kgs (256 buttons) 4th Qtr	07/27/98 09/30/98
IP32032	Stabilize 201 kgs (96 buttons) 1st Qtr	10/01/98 12/31/98
IP32031	M\S-M- COMMENCE REPACK OPS AT PFP 10/31/00	10/31/00 10/31/00
IP33031Z	Repackage 679 kgs oxide in PuSH, 1st Qtr	10/31/00 01/30/01
IP33031Z	Repackage 321 kgs oxide in PuSH, 2nd Qtr	01/31/01 05/01/01
IP33031Z	Repackage 321 kgs oxide in PuSH, 3rd Qtr	05/02/01 08/01/01
IP33031Z	Repackage 1376 kgs oxide in PuSH, 4th Qtr	08/02/01 09/28/01
IP32033	M\S-M-START RESTAB HIGH ASSAY OXIDE 7/31/99	07/30/99 07/30/99
IP33033Z	Repackage 178 kgs oxide in PuSH -1st Qtr	10/01/01 12/31/01
IP33033Z	Repackage 1272 kgs oxide - 2nd Qtr	01/02/02 04/01/02



ACTIVITY ID	Description	E_Start E_Finish
IP33033Z	Repackage 126 kgs oxide in PuSH -3rd Qtr	04/02/02 05/06/02
IP32018	M\S-M-COMP THERMAL STA B/REPACK OF Pu 5/31/02	05/31/02 05/31/02
IP33018Z	Stabilize 851 kgs of matl - 2nd Qtr	01/31/01 05/01/01
IP33018Z	Stabilize 851 kgs of matl - 3rd Qtr	05/02/01 08/01/01
IP33018Z	Stabilize 811 kgs of matl - 1st Qtr	10/01/01 12/31/01
IP33018Z	Stabilize 331 kgs of matl - 3rd Qtr	04/02/02 05/31/02
	Post operation clean up	06/03/02 06/28/02



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SISMP

Revision:

STRIP 7

PFP Project Master Baseline Schedule

BAR TYPES

- ▷ OTHER
- △ WHC-KEY
- ● RL/PBI Completed
- ● FO Completed
- ● HQ Completed
- ▶ OTHER Completed
- ▲ WHC-KEY Completed
- ● TPA Completed
- ◆ Completed
- ▭ Schedule Current
- ▬ __Progress Percent Complete
- ◇ __Milestone
- ○ RL or PBI
- ○ FO
- ○ M-HQ
- ○ TPA
- ◇ default

HIGHLIGHTS

- ▭ NORMAL
- ▭ Critical-941

ANNOTATION

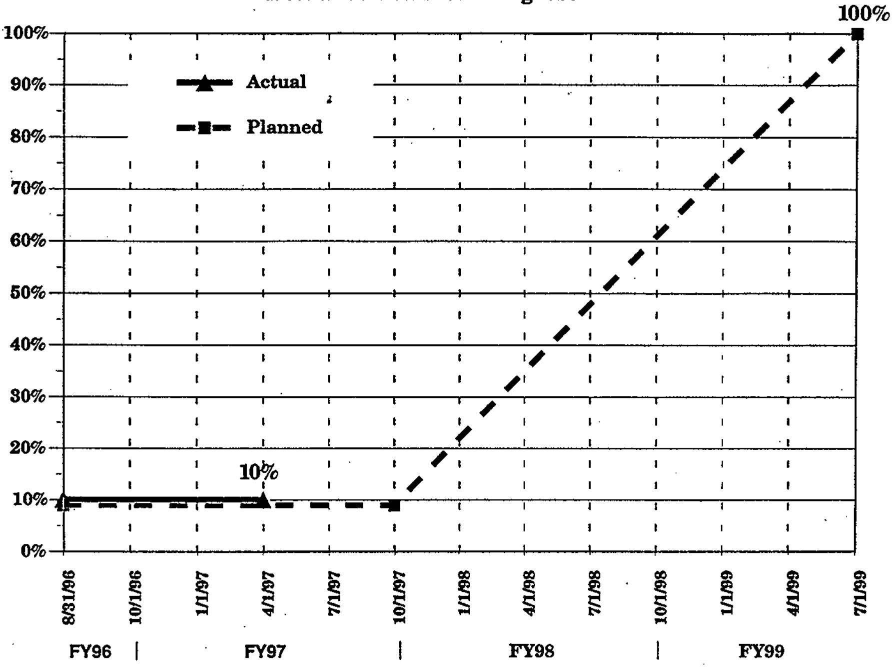
▭ N1

CODES

N1

Polycubes Preparation Phase

Actual vs Planned Progress



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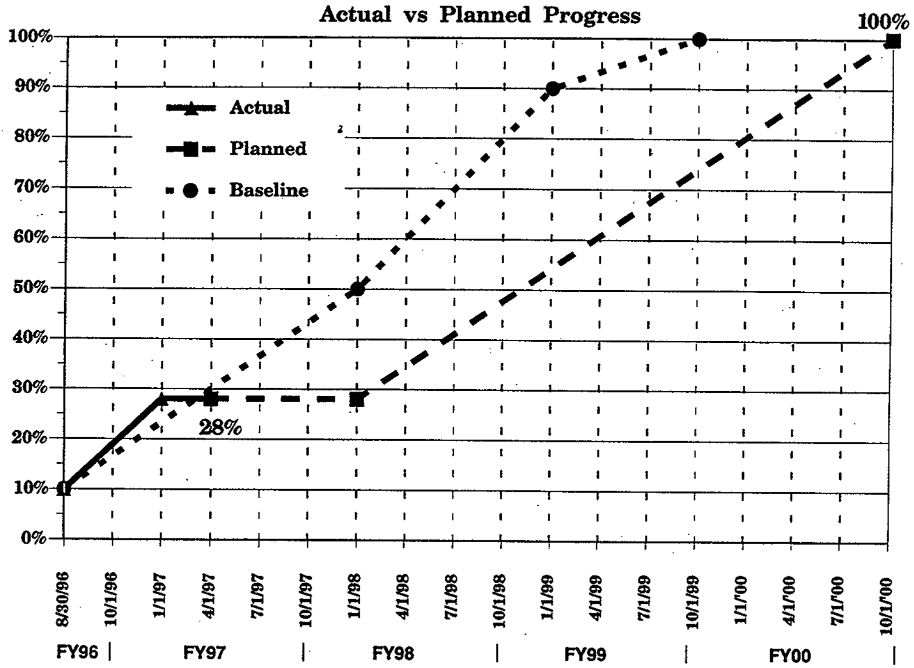
PuSAP System Preparation Phase



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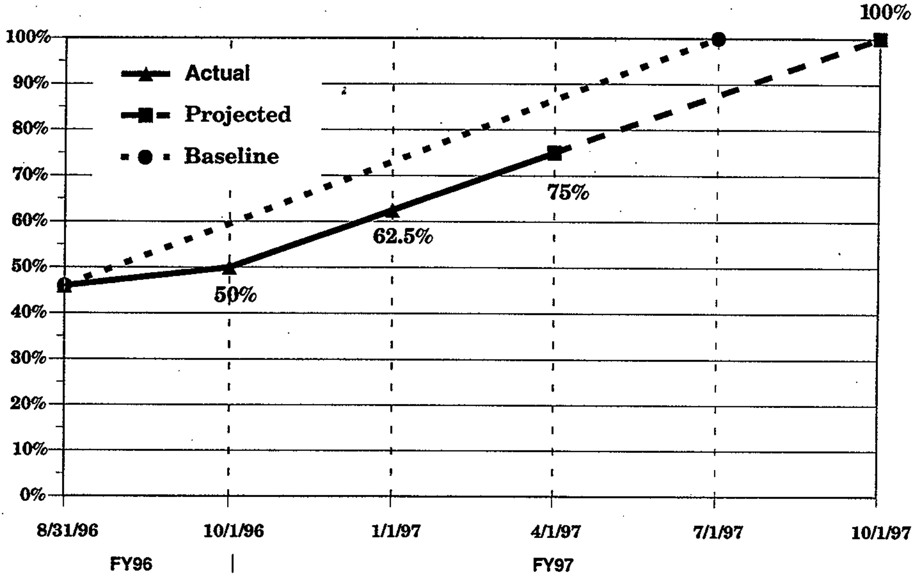
Solutions Preparation Phase

Actual vs Planned Progress



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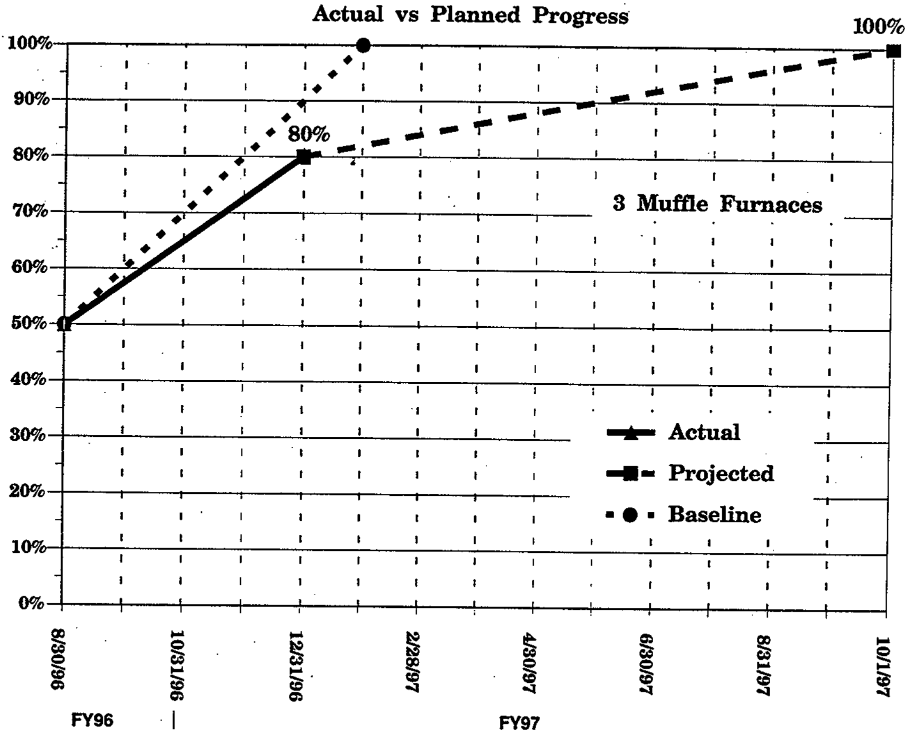
Metals Preparation Phase



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HNF-EP-0853
Revision 5
Volume 3

DNFSB Recommendation 94-1 Hanford Site Integrated Stabilization Management Plan

Date Published
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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
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DNFSB RECOMMENDATION 94-1
HANFORD SITE INTEGRATED STABILIZATION MANAGEMENT PLAN
VOLUME 3: PLUTONIUM VULNERABILITY CORRECTIVE ACTION PROGRAM

EXECUTIVE SUMMARY

The Hanford Site Integrated Stabilization Management Plan (SISMP) was developed in support of the U.S. Department of Energy's (DOE) Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 Integrated Program Plan (IPP). Volume 1 of the SISMP identifies the technical scope and costs associated with Hanford Site plans to resolve concerns identified in DNFSB Recommendation 94-1. Volume 2 of the SISMP provides the Resource Loaded Integrated Schedules for Spent Nuclear Fuel Project and Plutonium Finishing Plant activities identified in Volume 1 of the SISMP. Volume 3 of the SISMP identifies the 35 Plutonium Environmental, Safety, and Health Vulnerabilities. The vulnerabilities range from institutional problems to specific hardware problems. Many of the identified vulnerabilities will be corrected through the stabilization and packaging activities required by the DNFSB Recommendation 94-1 Implementation Plan, the remainder will be corrected as a part of the plutonium handling facilities transition (deactivation) to the Environmental Restoration Program.

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1.0 INTRODUCTION

The Hanford Site Self Assessment of Plutonium Environmental Safety and Health (ES&H) Vulnerabilities was conducted in accordance with the U.S. Department of Energy (DOE) Secretary's directive of February of 1994. The implementation plans to carry out this directive are contained in the Project Plan and the Assessment Plan. For this assessment, vulnerabilities are defined as "conditions or weaknesses that may lead to unnecessary or increased radiation exposure of the workers, release of radioactive materials to the environment, or radiation exposure of the public."

The Project Plan calls for all isotopes and forms of plutonium separated from reactor fuels to be included in the assessment scope with certain defined exceptions. Details are contained in the Project Plan; however, the principal exceptions follow:

- Intact nuclear weapons
- Nuclear explosives assemblies
- Plutonium dispersed in nuclear device testing
- Plutonium in high-level, low-level, and transuranic (TRU) wastes
- Plutonium in facilities that are in the Decontamination and Decommission (D&D) Program, and
- Irradiated fuel.

The purpose of the Assessment was to evaluate environmental, safety, and health vulnerabilities from plutonium operations and storage activities. Acts of sabotage or diversion of plutonium which obviously may have ES&H implications are excluded from this study because separate DOE programs evaluate those issues on a continuing basis. Security and safeguards activities which may have negative impacts on safety are included in the evaluation.

The Hanford Site is a 1,450-km^2 (560-mi^2) tract of semiarid land located within the Columbia River Basin in southeastern Washington State.

Since the early 1940's, the Hanford Site has been engaged primarily in weapons material production and nuclear energy research and development. Since the late 1980's, the mission of the Hanford Site has changed to one of restoration and cleanup. One legacy of earlier missions is several facilities that contain quantities of plutonium. These plutonium quantities potentially present Environmental, Safety, and Health vulnerabilities for the Site.

In order to effectively evaluate the vulnerabilities, this Hanford Site Self Assessment of Plutonium ES&H Vulnerabilities was conducted. More than 500 Hanford Site buildings were evaluated for inclusion in this Assessment. All buildings that have ever handled plutonium were identified and designated as in-scope or out-of-scope of this assessment. Burial grounds, tank farms, and liquid waste disposal sites (e.g., pond, cribs, ditches, and reverse wells [french drains]), were defined as out-of-scope by the U.S. Department of Energy-Headquarters (DOE-HQ) Assessment leaders. Facilities that have been turned over to the Decontamination and Decommissioning Program were also excluded from the scope. Plutonium contained in irradiated fuel (e.g., the Fast Flux Test Facility and K Basins) is covered in the Spent Fuel Vulnerability Assessment.

There was no discovery of previously unknown conditions or circumstances; however, the review has provided the opportunity to refocus attention on some matters that need thoughtful consideration and response. There were no catastrophic consequences identified.

A total of 35 vulnerabilities were identified at Hanford (including Pacific Northwest National Laboratory [PNNL]). These vulnerabilities are mostly attributable to aging of facilities; facility operations being terminated prior to removal of residual plutonium; some lack of characterization of material and container configuration of the plutonium stored in vaults, lack of direction and planning for long-term storage/disposition of plutonium; loss of "corporate memory"; and increasing competition for available personnel resources. Additionally, reduction of funding is a potential threat to the maintenance of the required safety infrastructure.

The potential for loss of contamination control exists in several retired facilities because many of the former plutonium laboratories have been turned into office buildings. Contamination still exists under paint and in the ducts. The inadvertent penetration of a containment or confinement barrier could result in contamination of personnel or environs.

The plans to correct the 35 identified vulnerabilities are presented in this volume of the Hanford Site Integrated Stabilization Management Plan (SISMP). Where corrective actions are complete and the U.S. Department of Energy, Richland Operations Office (RL) has accepted closure of the vulnerability, the vulnerability is shown as complete and no additional discussions are provided. Program management is listed by vulnerability, and in the case of "retired facilities," by building.

Overall management of this SISMP and coordination and statusing of the actions is the responsibility of those listed below.

Overall completion of this program is tied to the completion of the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 program and completion of turnover of retired facilities to the Environmental Restoration Program. Individual vulnerabilities will be closed out earlier as they are remediated.

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

1.1 Scope

The scope of the Hanford's Plutonium Vulnerability Program is the remediation of the vulnerabilities shown in Table 1.

Table 1. Hanford Plutonium ES&H Vulnerabilities

NUMBER	TITLE	DOE-HQ LIKELIHOOD & CONSEQUENCE	STATUS
RL-1.0.1	Competing Priorities for Experienced Personnel (All Plutonium Facilities)	N/A	Complete
RL-1.0.2	Penetration of Glovebox Barriers (All Plutonium Facilities)	High/Worker-Low	Complete
RL-1.0.3	Isolation and Layaway of Gloveboxes (All Plutonium Facilities)	High/Worker-Low	Working
RL-1.0.4	Polymer-Based Panels and Glovebox Windows (All Plutonium Facilities)	High/Worker-Low	Working
RL-1.0.5	Penetration of Contamination Containment/Fixative (All Plutonium Facilities)	High/Worker-Low	Working
RL-2.0.1	Insufficient Knowledge of Packaging Configuration and Nature of Material in Building 324 (PNNL)	High/Worker-Low	Complete
RL-2.0.2	Insufficient Knowledge of Packaging Configuration and Nature of Material in Building 325 (PNNL)	High/Worker-Low	Working
RL-2.0.3	Insufficient Knowledge of Packaging Configuration and Nature of Material in Other PNNL Buildings (PNNL)	High/Worker-Low	Complete
RL-3.0.1	Criticality Accident During Deactivation or D&D Activities Due to Abnormal Conditions (All WHC Plutonium Facilities)	Medium/Worker-High	Working

NUMBER	TITLE	DOE-HQ LIKELIHOOD & CONSEQUENCE	STATUS
RL-3.1.2.1	232-Z Incinerator Contamination Release Due to Seismic Destruction of Building (PFP)	NPH*/Worker-High Public-Low Environment-High	Complete
RL-3.1.2.2	Release of Plutonium Holdup in Exhaust Ducts Downstream of 234-5Z Final HEPA Filters Via 291-Z Stack Exhaust Blowers (PFP)	Low/Worker-Low Environment-Medium	TBD
RL-3.1.2.3	Concrete Block Wall and Doors at the South End of the PRF Canyon Fail DBE Analysis (PFP)	NPH/Worker-High Public-Low Environment-High	Complete
RL-3.1.3.1	Hydrogen Generation in Solution Storage Containers Which Are Not Vented (PFP)	High/Worker-High	Complete
RL-3.1.3.2	Plutonium Stored in Unstable Forms (PFP)	High/Worker-High	See SISMP Vol 1
RL-3.1.3.3	Deterioration of Storage Containers (PFP)	High/Worker-High	See SISMP Vol 1
RL-3.1.3.4	Insufficient Knowledge of Packaging Configuration and Characterization of Material (PFP)	High/Worker-High	See SISMP Vol 1
RL-3.1.4.1	Injury or Contamination During PRF Canyon Entry (PFP)	Low/Worker-High	Planning
RL-3.1.4.2	Reactive Chemicals in PFP Gloveboxes	High/Worker-Low	Complete
RL-3.1.5.1	Breach of Drain Lines with Holdup in PFP	High/Worker-Low	Working
RL-3.1.5.2	HF Corrosion of Exhaust Ventilation Ductwork and Primary Filters Servicing Glovebox HC-9B and HA-46 in PFP	High/Worker-Low	Working

NUMBER	TITLE	DOE-HQ LIKELIHOOD & CONSEQUENCE	STATUS
RL-3.1.5.3	Corrosion of Ductwork Servicing Laboratories by Acids (PFP)	Not Listed	Complete
RL-3.1.5.4	Worker Exposure from Exhaust Ventilation Ductwork and Process Vacuum System (PFP)	High/Worker-Low	Working
RL-3.1.6.1	Contamination and Exposure from Cleaning 242-Z (PFP)	High/Worker-Low	TBD
RL-3.2.1	PUREX Pu Residual Inventory	High/Worker-Low	Complete
RL-3.2.2	Residuals in PUREX Tunnels	Low/ Worker-Low Environment-Medium	Working
RL-3.2.3	Release of Residual Deep Bed Filter Contamination Via the PUREX Main Stack	Low/ Worker-Low	Working
RL-3.2.4	Inadvertent Breach of Gross Pu Contamination Beneath Paint in the PUREX White Room	High/Worker-Medium	Complete
RL-3.3.1.1	Contamination Spread Resulting from Loss of Control Resulting from a Roof Fire at Retired Facilities	Low/Worker-Medium Public-Medium Environment-High	Working 222-T Unfunded
RL-3.3.1.2	Potential Loss of Containment Integrity - Retired Facilities: 222-B & T, 202-S, 308, 309, 3706	Medium/Worker-Low Environment-High	Working 222-T Unfunded
RL-3.3.2.1	340 Waste Handling Complex Release to Environment	Low/Worker-Low	Scheduled FY 1997
RL-3.3.2.2	Sand Filters at 221-B, 221-T, and 202-S	Low/Worker-Low Environment-Low	Complete
RL-3.3.2.3	Z-9 Building Frequent Contamination Outside of Engineered Barriers	High/Worker-Low Environment-Medium	TBD
RL-3.3.2.4	Release of Plutonium from 231-Z Duct	Low/No Target specified	TBD

NUMBER	TITLE	DOE-HQ LIKELIHOOD & CONSEQUENCE	STATUS
RL-3.3.2.5	Residual Plutonium in 209-E	Low/Worker-Low	Planning
RL-WGAT-1	Criticality and Contamination Potential in Settling Tank 241-Z-361	Low/Worker-High	TBD

* Natural Phenomena Hazards (NPH)

2.0 RL-1.0.1 COMPETING PRIORITIES FOR EXPERIENCED PERSONNEL

Complete

3.0 RL-1.0.2 PENETRATION OF GLOVEBOX BARRIERS

Complete

4.0 RL-1.0.3 ISOLATION AND LAYAWAY OF GLOVEBOXES

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

4.1 Scope

This vulnerability is applicable to the following facilities:

PFP BUILDINGS: 234-5Z, 236-Z, 242-Z, 232-Z, 241-Z

PUREX (202-A)

216-Z-9, 209-E, 222-T, 231-Z, 308

4.2 Remediation Objectives

The objective of this remediation is to transition unneeded gloveboxes to a deactivated state that meets the criteria for turnover to the EM-40 program.

4.3 Remediation Process

Gloveboxes will be cleaned out to minimal holdup levels, excess equipment and combustibles removed, services (ie water, electrical, gas supply) terminated, residual contamination fixed in place, and all glovebox penetrations sealed.

4.4 Schedule Objectives

The schedule objectives for RL-1.0.3 are shown in Table 2.

Table 2. Schedule Objectives for RL-1.0.3

BUILDING	START DATE	FINISH DATE	COMMENTS
234-5Z	FY 1996	FY 2007	Working
236-Z	FY 2000	FY 2005	
242-Z	FY 2002	FY 2007	
232-Z	N/A	N/A	Complete
241-Z	FY 2003	FY 2004	
202-A (PUREX)	FY 1994	FY 1997	Complete
216-Z-9	FY 2000	FY 2002	
209-E	TBD	TBD	
222-T	TBD	TBD	
231-Z	FY 2001	FY 2003	
308	N/A	N/A	Complete

4.5 Assumptions

EM-40 acceptance criteria is unchanged from the January 1994 draft.

4.6 Issues and Problems

The EM-40 acceptance criteria is still in draft form.

4.7 Alternatives/Impacts

Removal of gloveboxes may be required by RL to better manage risks associated with the deactivation of the PFP complex.

4.8 Technology Development

Fielding of technologies proven by DOE EM-50 will be sufficient for this work.

5.0 RL-1.0.4 POLYMER-BASED PANELS AND GLOVEBOXES WINDOWS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

5.1 Scope

This vulnerability is applicable only to active plutonium processing facilities. Where these panels exist in inactive facilities, the vulnerability is a duplicate of RL-1.0.3. The buildings where this vulnerability is applicable are: 234-5Z, 236-Z, 241-Z. The 2736-ZB glovebox has glass windows.

5.2 Remediation Objectives

The objective of this remediation is to transition unneeded gloveboxes to a deactivated state that meets the criteria for turnover to the EM-40 program.

5.3 Remediation Process

Gloveboxes will be cleaned out to minimal holdup levels, excess equipment and combustibles removed, services (ie water, electrical, gas supply) terminated, residual contamination fixed in place, and all glovebox penetrations sealed.

5.4 Schedule Objectives

The schedule objectives for RL-1.0.4 are shown in Table 3.

Table 3. Schedule Objectives for RL-1.0.4

BUILDING	START DATE	FINISH DATE	COMMENTS
234-5Z	FY 1996	FY 2002	
236-Z	FY 1998	FY 2000	
241-Z	FY 2001	FY 2002	

5.5 Assumptions

That the EM-40 acceptance criteria will be issued as drafted in the January 1994 draft.

5.6 Issues and Problems

The EM-40 acceptance criteria is still in draft form.

5.7 Alternatives/Impacts

N/A

5.8 Technology Development

N/A

6.0 RL-1.0.5 PENETRATION OF CONTAMINATION CONTAINMENT/FIXATIVE

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

6.1 Scope

The typical method for containing contamination has been through the use of paint. The paint is applied after initial decontamination using methods such as washing and wiping. In most cases an initial coat of yellow paint was applied as a warning of contamination followed by a second coat of paint of a different color (often grey or white). No further markings were applied prior to about 1990. Since that time contamination areas are required to be labeled and mapped in addition to the painting described above.

This vulnerability is applicable to the following facilities:

234-5Z, 236-Z, 242-Z, 232-Z, 241-Z, 291-Z, 2736-Z, 2736-ZB, 202A (PUREX), 216-Z-9, 209-E, 222-B, 222-T, 231-Z, 308, 309, and 3706.

6.2 Remediation Objectives

The objective of this remediation is to deactivate former plutonium handling facilities and transition them to EM-40 for final D&D.

The preferred method for remediation is to remove all fixed contamination from areas where inadvertent containment penetration is likely. These areas include high traffic areas, areas exposed to the weather, areas subject to impact or abrasion. Where it is not feasible to remove contamination and where removal for the contamination is best left for facility D&D, the contamination will be marked, mapped, and controlled per the Radiation Control Manual requirements. In some areas new fixatives may be required.

For facilities in the process of deactivation, the end point for this remediation will be meeting the acceptance criteria for turnover to the EM-40 Program. Each facility in the process of deactivating has acceptance criteria specific to that facility. The normal acceptance criteria is to ensure the contamination is fixed, marked, mapped, and controlled per the Radiation Control Manual.

6.3 Remediation Process

The normal method for remediation is to fix contamination with two or more coats of paint. The painted over contamination is then labeled and controlled per the requirements of the Radiological Control Manual.

The method for removal of fixed contamination will vary depending on the base strata. Contaminated asphalt is being cutout and disposed of as radioactive waste. Contaminated concrete can be scabbled or removed. Contaminated metal can be cleaned using any of a number of methods.

Where removal is not possible and where marking and mapping painted over contamination do not provide the needed level of protection to workers, new fixative methods will be used. These include use of concrete caps or physical barriers.

6.4 Schedule Objectives

The schedule objectives for RL-1.0.5 are shown in Table 4.

Table 4. Schedule Objectives for RL-1.0.5

BUILDING	START DATE	COMPLETION DATE	STATUS
234-5Z	MAY 1996	FY 2007	WORKING
236-Z	FY 2000	FY 2005	
242-Z	FY 2002	FY 2007	
232-Z	N/A	N/A	COMPLETE
241-Z	FY 2003	FY 2004	
291-Z	FY 1998	FY 2007	
2736-Z	FY 1999	FY 1999	
2736-ZB	FY 1999	FY 1999	
PUREX	1992	FY 1997	WORKING
216-Z-9	FY 2001	FY 2001	
209-E	TBD	TBD	PLANNING
222-B	N/A	N/A	COMPLETE
222-T	TBD	TBD	
231-Z	FY 2001	FY 2003	
308	N/A	N/A	COMPLETE
309	1994	FY 2000	WORKING
3706	FY 1997	FY 1998	

6.5 Assumptions

That compliance with the Radiation Control Manual requirements for decontaminating, containing, marking, and mapping contamination is sufficient for compliance with the EM-40 acceptance criteria.

6.6 Issues and Problems

Funding problems in fiscal year (FY) 1997 and FY 1998 caused a two to four year slip in the projected completion dates for the PFP complex.

The EM-40 acceptance criteria is still in draft form.

6.7 Alternatives/Impacts

N/A

6.8 Technology Development

Decontamination technologies demonstrated by EM-50 will be sufficient for this scope of work.

7.0 RL-2.0.1 INSUFFICIENT KNOWLEDGE OF PACKAGING CONFIGURATION AND NATURE OF MATERIAL IN BUILDING 324.

Complete

8.0 RL-2.0.2 INSUFFICIENT KNOWLEDGE OF PACKAGING CONFIGURATION AND NATURE OF MATERIAL IN BUILDING 325

RL Program Manager:	R. F. Christensen	1-509-372-4900
Contractor Program Manager:	D. M. Montgomery	1-509-376-4204

8.1 Scope

This vulnerability is applicable to Building 325.

8.2 Remediation Objectives

Surplus material will be shipped to PFP for stabilization in the DNFSB Recommendation 94-1 Program or disposed of as waste. Materials that will be maintained in use will be inspected and any resultant problems corrected.

8.3 Remediation Process

Excess usable plutonium-bearing material has been shipped to PFP and is currently stored in PFP's vaults. This material was inspected prior to shipping and does meet PFP's vault acceptance criteria. Excess material to be dispositioned as waste is being prepared for discard per Hanford solid waste acceptance criteria. Items to remain in service have been inspected and were found to be in acceptable condition.

8.4 Schedule Objectives

Work was initiated on this vulnerability in 1995. Completion of disposal of items declared as excess is scheduled for the end of FY 1997.

8.5 Assumptions

N/A

8.6 Issues and Problems

N/A

8.7 Alternatives/Impacts

N/A

8.8 Technology Development

N/A

9.0 RL-2.0.3 INSUFFICIENT KNOWLEDGE OF PACKAGING CONFIGURATION AND NATURE OF MATERIAL IN OTHER PNNL BUILDINGS

Complete

10.0 RL-3.0.1 CRITICALITY ACCIDENT DURING DEACTIVATION OR D&D ACTIVITIES DUE TO ABNORMAL CONDITIONS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

10.1 Scope

This vulnerability is applicable to the following facilities: PFP, PUREX, 241-Z-361 Tank, and 209E.

10.2 Remediation Objectives

The objective of this remediation is to transition these facilities to a safe, deactivated state that meets the criteria for turnover to the EM-40 program. This includes the removal of excess fissile material and fixing residuals in place to preclude criticalities during future D&D activities.

10.3 Remediation Process

The major parts of this remediation are the removal and disposition of excess fissile materials, fixing, marking, and mapping residual plutonium, and compliance with the criticality prevention program. Excess fissile material will be prepared for disposal to Waste Isolation Pilot Plant (WIPP) criteria or transferred to PFP for stabilization and storage.

10.4 Schedule Objectives

PFP	Start:	February 1996
	Finish:	September 2005
PUREX		Complete
209-E		TBD
241-Z-361		This issue is covered by vulnerability RL-WGAT-1.

10.5 Assumptions

None

10.6 Issues and Problems

No programmatic guidance has been given to the 209E Building to initiate work associated with this vulnerability.

10.7 Alternatives/Impacts

N/A

10.8 Technology Development

N/A

11.0 RL-3.1.2.1 232-Z INCINERATOR CONTAMINATION RELEASE DUE TO SEISMIC DESTRUCTION OF BUILDING

Complete

12.0 RL-3.1.2.2 RELEASE OF PLUTONIUM HOLDUP IN EXHAUST DUCTS DOWNSTREAM OF 234-5Z FINAL HEPA FILTERS VIA 291-Z STACK EXHAUST BLOWERS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

12.1 Scope

This vulnerability is applicable to the 234-5Z and 291-Z Buildings. No assay data is available to positively quantify this vulnerability. Engineering estimates indicate up to 20 grams of plutonium is holdup in the ducts and plenum downstream of the 234-5Z final filters. Actual releases to the environment from this sources has been monitored for years. The releases are detectable, but are well below the regulatory limits.

12.2 Remediation Objectives

The objective of this remediation is eliminate the unfiltered airflow path by performing a modification to the ventilation system. This will be followed by cleaning out the ducts and plenum to meet the acceptance criteria for the EM-40 program.

12.3 Remediation Process

The remediation of this vulnerability will start after the majority of the deactivation of the 234-5Z Building has occurred. Currently, it is envisioned that a new, but smaller, exhaust system complete with double HEPA filtration, a new stack, and air quality monitoring, will be constructed between the 234-5Z and 291-Z Buildings. This system will tie into the duct connecting these two buildings and will replace the current exhaust system. After tie-in of the new exhaust system, the 291-Z Stack will be capped. Air will then flow from all contamination areas through the filters. At this point cleanup can proceed without the risk of incidental releases to the environment.

12.4 Schedule Objectives

Start construction:	FY 2002
Complete Cleanup:	FY 2003

12.5 Assumptions

That sufficient funding will be available to perform the modifications.

12.6 Issues and Problems

The EM-40 acceptance criteria is still in draft form.

Complete holdup data is not available to enable quantification of the vulnerability.

12.7 Alternatives/Impacts

TBD

12.8 Technology Development

TBD

13.0 RL-3.1.2.3 CONCRETE BLOCK WALL AND DOORS AT SOUTH END OF PRF CANYON FAIL DBE ANALYSIS

Complete

14.0 RL-3.1.3.1 HYDROGEN GENERATION IN SOLUTION STORAGE CONTAINERS WHICH ARE NOT VENTED

Complete

15.0 RL-3.1.3.2 PLUTONIUM STORED IN UNSTABLE FORMS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

15.1 Scope

This vulnerability is applicable to selected plutonium-bearing residues, oxides, and metals stored in the 234-5Z and 2736-Z facilities.

The specific materials in question are:

- Sludges
- 46 items of Incinerator Ash

- Sand, Slag, and Crucible
- Polycubes, and
- Metal turnings.

15.2 Remediation Objectives

The objective of this remediation is to transform these materials to a form suitable for 50-year storage or for discard to WIPP.

The specific dispositions for the materials in question are:

• Sludges	Thermal stabilization	Complete
• 46 items of Incinerator Ash	Thermal stabilization	Complete
• Slag, and Crucible	Cementation and discard	Working
• Polycubes	Thermal stabilization	FY 1999
• Metal turnings	Thermal stabilization	Complete

15.3 Remediation Process

See SISMP Volume 1.

15.4 Schedule Objectives

See SISMP Volume 2.

15.5 Assumptions

See SISMP Volume 1.

15.6 Issues and Problems

See SISMP Volume 1.

15.7 Alternatives/Impacts

N/A

15.8 Technology Development

N/A

16.0 RL-3.1.3.3 DETERIORATION OF STORAGE CONTAINERS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

16.1 Scope

This vulnerability is applicable to plutonium-bearing materials stored in Buildings 234-5Z and 2736-Z only.

16.2 Remediation Objectives

The remediation of this vulnerability will be complete when either the container life assessment is complete with a finding that there are no imminent risks or that the inventory of plutonium-bearing materials is stabilized and packaged to DOE-STD-3013, the Interim Storage Criteria, or WIPP/WAC.

16.3 Remediation Process

See SISMP Volume 1 for the stabilization and repackaging portion of this remediation.

An evaluation of the condition of the storage containers used at PFP was initiated in March 1995. This evaluation includes visual inspections, radiography, and destructive evaluation of containers. To date no significant deterioration has been observed.

16.4 Schedule Objectives

See SISMP Volume 2 for the stabilization and packaging portion of this vulnerability.

Evaluation of the existing containers was started in March 1995 and will be completed in September 1998.

16.5 Assumptions

N/A

16.6 Issues and Problems

N/A

16.7 Alternatives/Impacts

N/A

16.8 Technology Development

N/A

17.0 RL-3.1.3.4 INSUFFICIENT KNOWLEDGE OF PACKAGING CONFIGURATION AND CHARACTERIZATION OF MATERIAL

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

17.1 Scope

This vulnerability is applicable to selected plutonium-bearing items stored in the 234-5Z and 2736-Z Buildings.

17.2 Remediation Objectives

Remediation of this vulnerability will be complete when the inventory of plutonium-bearing items is stabilized and packaged to meet the DOE-STD-3013, the Criteria for Interim Storage of Plutonium Bearing Material, or WIPP/WAC, or the evaluation of the inventory has been completed and applicable characterization of the inventory has been obtained.

17.3 Remediation Process

See SISMP Volume 1 for stabilization and packaging information.

Characterization of the inventory will be done through review of available documentation, radiography, destructive and non-destructive evaluations.

17.4 Schedule Objectives

See SISMP Volume 2 for the stabilization and packaging information.

The evaluation of the packaging configuration of the storage containers used at PFP was initiated in March 1995. The evaluation is scheduled to be complete September 1998.

17.5 Assumptions

N/A

17.6 Issues and Problems

N/A

17.7 Alternatives/Impacts

N/A

17.8 Technology Development

N/A

18.0 RL-3.1.4.1 INJURY OR CONTAMINATION DURING PRF CANYON ENTRY

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

18.1 Scope

This vulnerability is applicable to the 236-Z (PRF) Building only. The canyon is contaminated with plutonium that leaked out of the processing equipment during past production campaigns. The PRF facility is no longer in use but an estimated 12 kgs of plutonium has been deposited on the canyon floor.

18.2 Remediation Objectives

The objective of this remediation is to remove the plutonium contamination from the floor to a point that is acceptable to the EM-40 program. The method of removal has not been determined but is expected to be a remote.

18.3 Remediation Process

TBD

18.4 Schedule Objectives

This remediation is scheduled for FY 2000-2005.

18.5 Assumptions

The EM-40 Acceptance Criteria in the Jan 1994 draft will be issued unchanged.

18.6 Issues and Problems

The EM-40 Acceptance Criteria is still in draft.

18.7 Alternatives/Impacts

TBD

18.8 Technology Development

TBD

19.0 RL-3.1.4.2 REACTIVE CHEMICALS IN PFP GLOVEBOXES

Complete

20.0 RL-3.1.5.1 BREACH OF DRAIN LINES WITH HOLDUP IN PFP

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

20.1 Scope

This vulnerability is applicable to the exposed, abandoned, drain lines in the 234-5Z Building. The drain lines between the 234-5Z and 241-Z Buildings were replaced with double contained pipes. The active drain lines in 234-5Z were replaced with new lines in 1995.

This vulnerability is also applicable to the 291-Z sump and associated drain lines. The sump is contains an estimated 20 grams of Pu. The Pu came from, now removed, process vacuum pumps.

20.2 Remediation Objectives

Remediation of this vulnerability will be complete when the 291-Z sump drain lines in the 234-5Z tunnels are cleaned to meet the EM-40 acceptance criteria. The drain lines in the 291-Z Building associated with the sump will be removed and replaced with new lines.

20.3 Remediation Process

Modifications to the area around the sump including the removal of old equipment is required prior to start of the cleanup. The flows into the sump will be routed to a catch tank outside the sump. When these modifications are complete the floor drains will be flushed and the sump will be pumped out. All other contaminated piping and pumps associated with the sump will be removed. The 291-Z sump will be cleaned out using standard industry methods. Following cleanup, any residual contamination will be quantified, fixed in place, marked and mapped per radiological control requirements.

20.4 Schedule Objectives

The remediation in 291-Z is ongoing and is scheduled for completion in FY 1998.

The remediation in 234-5Z is scheduled for FY 2005.

20.5 Assumptions

The EM-40 Acceptance Criteria in the Jan 1994 draft will be issued unchanged.

20.6 Issues and Problems

The EM-40 Acceptance Criteria in still in draft form.

20.7 Alternatives/Impacts

N/A

20.8 Technology Development

N/A

21.0 RL-3.1.5.2 HF CORROSION OF EXHAUST VENTILATION DUCTWORK AND PRIMARY FILTERS SERVICING GLOVEBOX HC-9B AND HA-46 IN PFP

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

21.1 Scope

This vulnerability is applicable to the 234-5Z Building only. Two portions of process exhaust duct are in question. They are the Filter Box 9A to 9B Bypass

Duct and the ducting from Filter Boxes 9A and 9B to Filter Box 9AB. These ducts and filter boxes contain approximately 4 kgs of plutonium.

21.2 Remediation Objectives

The objective of this remediation is to remove these segments of ducts since they are no longer required and they contain significant quantities of plutonium.

21.3 Remediation Process

The ducts will be segmented, moved to a glovebox where the loose plutonium is removed by brushing and collected for thermal stabilization. The duct is then crushed and packaged to WIPP/WAC in 55-gallon drums.

21.4 Schedule Objectives

Work Started February 1996 and will be completed by September 1997.

To date the Filter Box 9A to 9B Bypass Duct containing 2.1 kgs of plutonium has been removed. The direct route to the 291-Z stack from Filter Box 9AB has been removed and work is starting on the removal of the remaining duct work.

21.5 Assumptions

N/A

21.6 Issues and Problems

N/A

21.7 Alternatives/Impacts

N/A

21.8 Technology Development

N/A

22.0 RL-3.1.5.3 CORROSION OF DUCTWORK SERVICING LABORATORIES BY ACIDS

Complete.

23.0 RL-3.1.5.4 WORKER EXPOSURE FROM EXHAUST VENTILATION DUCTWORK AND PROCESS VACUUM SYSTEM

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

23.1 Scope

This vulnerability is applicable to the Process Vacuum System ducting both active and abandoned located in the 234-5Z and 291-Z Buildings, and the HF exhaust ducting located in Building 234-5Z. (See Section 4.21.)

23.2 Remediation Objectives

The objective of this remediation is to remove the ducting and filter boxes with significant plutonium holdup.

23.3 Remediation Process

The ducts will be removed as described in Section 21.0.

23.4 Schedule Objectives

Remediation of the HF ducting started in FY 1996 and will be complete in FY 1997. Process Vacuum System remediation will occur in FY 1997.

23.5 Assumptions

N/A

23.6 Issues and Problems

N/A

23.7 Alternatives/Impacts

N/A

23.8 Technology Development

N/A

24.0 RL-3.1.6.1 CONTAMINATION AND EXPOSURE FROM CLEANING 242-Z

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

24.1 Scope

This vulnerability is applicable to the 242-Z Building.

24.2 Remediation Objectives

The objective of this remediation is to transition the 242-Z facility to the EM-40 Program.

24.3 Remediation Process

The method of decontamination has not been defined at this time.

24.4 Schedule Objectives

Start 242-Z Cleanup: FY 2002
Complete 242-Z deactivation and turnover: FY 2007

24.5 Assumptions

N/A

24.6 Issues and Problems

The EM-40 acceptance criteria for facility turnover has not been issued.

24.7 Alternatives/Impacts

TBD

24.8 Technology Development

TBD

25.0 RL-3.2.1 PUREX PU RESIDUAL INVENTORY

Complete

26.0 RL-3.2.2 RESIDUALS IN PUREX TUNNELS

RL Program Manager:	L. D. Romine	1-509-376-4747
Contractor Program Manager:	M. B. Enghusen	1-509-373-3837

26.1 Scope

This vulnerability is applicable to the two PUREX Tunnels and the contaminated equipment stored in them.

26.2 Remediation Objectives

The tunnels will be transitioned to the Environmental Restoration Program D&D.

26.3 Remediation Process

The tunnels will be deactivated and transferred to EM-40 for D&D. All new storage in the tunnels has been stopped. The EM-40 acceptance requires tunnels exhaust system will be blanked and the tunnels to be posted per the Radiological Control Manual.

26.4 Schedule Objectives

The tunnels and associated stacks have been isolated and posted per EM-40 acceptance criteria. Formal closeout of this vulnerability is pending.

26.5 Assumptions

N/A

26.6 Issues and Problems

N/A

26.7 Alternatives/Impacts

N/A

26.8 Technology Development

N/A

27.0 RL-3.2.3 RELEASE OF RESIDUAL DEEP BED FILTER CONTAMINATION VIA THE PUREX MAIN STACK

RL Program Manager:	L. D. Romine	1-509-376-4747
Contractor Program Manager:	M. B. Enghusen	1-509-373-3836

27.1 Scope

This vulnerability is applicable to the PUREX Stack.

27.2 Remediation Objectives

The deep bed filters will be transitioned to the Environmental Restoration Program for final D&D.

27.3 Remediation Process

The deep bed filters have been posted per Radiological Control requirements. Filter #1 has been isolated and Filter #2 will remain in service to support the deactivated PUREX facility. All emissions from the stack are monitored to comply with air quality standards.

27.4 Schedule Objectives

PUREX deactivation is scheduled for FY 1997.

27.5 Assumptions

N/A

27.6 Issues and Problems

N/A

27.7 Alternatives/Impacts

N/A

27.8 Technology Development

N/A

28.0 RL-3.2.4 INADVERTENT BREACH OF GROSS PU CONTAMINATION BENEATH PAINT IN THE PUREX WHITE ROOM

Complete

29.0 RL-3.3.1.1 CONTAMINATION SPREAD RESULTING FROM LOSS OF CONTROL RESULTING FROM A ROOF FIRE AT RETIRED FACILITIES

RL Program Manager: R. S. Ollero 1-509-376-0663

BLDG 209-E RL Program Manager:	J. K. McClusky	1-509-372-0947
BLDG 209-E Contractor Program Manager:	J. H. Wicks	1-509-373-9372
BLDG 308 & 309 RL Program Manager:	O. A. Farabee	1-509-376-8089
BLDG 308 & 309 Contractor Program Manager:	J. M. Steffen	1-509-376-0484
BLDG 3706 RL Program Manager:	M. J. Elsen	1-509-376-8021
BLDG 3706 Contractor Program Manager:	S. J. Mattair	1-509-373-0577

29.1 Scope

This vulnerability is applicable to the 209E, 308, 309, and 3706 Buildings.

29.2 Remediation Objectives

The objective of this remediation is to deactivate the vulnerable facilities and turn them over to the EM-40 Program for D&D.

29.3 Remediation Process

The deactivation process will minimize facility hazards and reduce the consequence of contamination spread resulting from a roof fire.

29.4 Schedule Objectives

The schedule objectives for RL-3.3.1.1 is shown in Table 5.

Table 5. Plutonium Vulnerability RL-3.3.1.1 Status

APPLICABLE BUILDING	BUILDING STATUS	ROOF CONSTRUCTION	VULNERABILITY STATUS
209E	Active- waste storage	Wood with asphalt shingles	New composite shingles reduce vulnerability. Completion TBD.
308	Deactivated	Metal decking with builtup membrane over insulation board	Complete.
309	Deactivating	Metal decking with builtup membrane over insulation board	Closure pending formal turnover to EM-40. Completion FY-2000
3706	Offices vacant	Wood with asphalt shingles	FY 1998 Demolition

29.5 Assumptions

N/A

29.6 Issues and Problems

The acceptance criteria for the EM-40 Program has not been issued.

29.7 Alternatives/Impacts

N/A

29.8 Technology Development

N/A

30.0 RL-3.3.1.2 POTENTIAL LOSS OF CONTAINMENT INTEGRITY - RETIRED FACILITIES: 222-B & T, 202-S, 308, 309, 3706

RL Program Manager:	R. S. Ollero	1-509-376-0663

BLDG 222-B **COMPLETE**
BLDG 202-S **OUT-OF-SCOPE**

BLDG 222-T RL Program Manager:	M. J. Elsen	1-509-376-8021
BLDG 222-T Contractor Program Manager:	S. G. Mattair	1-509-373-0577
BLDG 308 & 309 RL Program Manager:	O. A. Farabee	1-509-376-8089
BLDG 308 & 309 Contractor Program Manager:	J. M. Steffen	1-509-376-0484

BLDG 3706 RL Program Manager:	M. J. Elsen	1-509-376-8021
BLDG 3706 Contractor Program Manager:	S. G. Mattair	1-509-373-0577

30.1 Scope

This vulnerability is applicable to the 222-B, 222-T, 308, 309, 3706 Buildings only. 202-S is specifically identified in the WGAT Report as out-of-scope for the Plutonium Vulnerability Program since it has been turned over to the Environmental Restoration Program.

30.2 Remediation Objectives

The objective of this remediation is to deactivate these facilities and turn them over to the EM-40 Program for D&D.

30.3 Remediation Process

The deactivation process will minimize facility hazards and reduce the likelihood of a containment breach while waiting for D&D.

30.4 Schedule Objectives

The schedule objectives for RL-3.3.1.2 is shown in Table 6.

Table 6. Plutonium Vulnerability RL-3.3.1.2 Status

APPLICABLE BUILDING	BUILDING STATUS	DEACTIVATION DATE	VULNERABILITY STATUS
222B	N/A	N/A	Complete
222T	Shutdown	N/A	TBD, unfunded
308	Deactivated	N/A	Complete
309	Deactivating	FY 2000	Working
3706	Vacated	FY 1997	FY 1998 Demolition

30.5 Assumptions

TBD

30.6 Issues and Problems

The acceptance criteria for the EM-40 Program has not been issued.

Programmatic guidance has not been issued and funding is not available for the deactivation of 222T and 3706 facilities.

30.7 Alternatives/Impacts

TBD

30.8 Technology Development

TBD

31.0 RL-3.3.2.1 340 WASTE HANDLING COMPLEX RELEASE TO ENVIRONMENT

RL Program Manager:	T. K. Teynor	1-509-376-1366
Contractor Program Manager:	L. W. Roberts	1-509-376-6857

31.1 Scope

This vulnerability is applicable to the 340-A Building tanks as they are the only structure that contains plutonium. The 340-A Building has six 8,000-gallon above grade liquid storage tanks with approximately 33 grams of plutonium in inventory.

31.2 Remediation Objectives

The objective of this remediation is to remove the plutonium-bearing sludge from the tanks and transport it to the Hanford Waste Tank Farms for disposal.

31.3 Remediation Process

The tanks will be flushed and the plutonium-bearing sludges will be loaded into rail tank cars for transport to the Hanford Tank Farms for disposal.

31.4 Schedule Objectives

The work is scheduled for fourth quarter FY 1997.

31.5 Assumptions

N/A

31.6 Issues and Problems

N/A

31.7 Alternatives/Impacts

N/A

31.8 Technology Development

N/A

32.0 RL-3.3.2.2 SAND FILTERS AT 221-B, 221-T, AND 202-S

Complete

33.0 RL-3.3.2.3 Z-9 BUILDING FREQUENT CONTAMINATION OUTSIDE OF ENGINEERED BARRIERS

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

33.1 Scope

This vulnerability is applicable to the 216-Z-9 Building. This building was constructed over the 216-Z-9 crib and was used to mine plutonium laden soil out of the crib. More than 90 kgs of plutonium were mined from the crib. This plutonium was packaged in waste drums and disposed of as TRU waste. The mining operations ceased in this building in the late 1970's but the facility was not deactivated or cleaned out to today's standards.

33.2 Remediation Objectives

The objective of this remediation is to deactivate the 216-Z-9 Building and transition it to the EM-40 Program for D&D.

33.3 Remediation Process

TBD

33.4 Schedule Objectives

Deactivation and cleanup is scheduled for FY 2002.

33.5 Assumptions

N/A

33.6 Issues and Problems

The EM-40 acceptance criteria has not been issued.

33.7 Alternatives/Impacts

TBD

33.8 Technology Development

TBD

34.0 RL-3.3.2.4 RELEASE OF PLUTONIUM FROM 231-Z DUCT

RL Program Manager: D. W. Templeton 1-509-373-2966
Contractor Program Manager: T. E. Huber 1-509-373-1503

34.1 Scope

This vulnerability is applicable to the 231-Z Building. No assay data is available on the 231-Z duct work.

34.2 Remediation Objectives

This vulnerability will be remediated when the plutonium holdup in the 231-Z duct work is reduced to a state that is acceptable to the Environmental Restoration Program.

34.3 Remediation Process

TBD depending on the levels of plutonium holdup. It can be assumed that this remediation will be similar to that described in Section 4.21. The remediation of the ducts cannot start until the remaining gloveboxes are deactivated.

34.4 Schedule Objectives

TBD

34.5 Assumptions

TBD

34.6 Issues and Problems

Programmatic ownership of this remediation is in question.

34.7 Alternatives/Impacts

TBD

34.8 Technology Development

N/A

35.0 RL-3.3.2.5 RESIDUAL PLUTONIUM IN 209-E

RL Program Manager: J. K. McClusky 1-509-372-0947
Contractor Program Manager: J. H. Wicks 1-509-373-9372

35.1 Scope

This vulnerability is applicable to the 209-E Building only.

35.2 Remediation Objectives

The objective of this remediation is to transition 209-E to the Environmental Restoration Program.

35.3 Remediation Process

The restoration process has not been defined since no programmatic direction has been issued to perform the work.

35.4 Schedule Objectives

TBD. Deactivation planning scheduled for FY 1997 will result in defining schedule objectives.

35.5 Assumptions

TBD

35.6 Issues and Problems

Lack of a safety basis for this 209-E facility has resulted in an Unreviewed Safety Question determination. This also has resulted in delays in performing the necessary field activities in support of deactivation planning.

The acceptance criteria for the EM-40 Program has not been issued.

Funding for the FY 1997 Deactivation Planning is uncertain.

35.7 Alternatives/Impacts

TBD

35.8 Technology Development

TBD

36.0 RL-WGAT-1 CRITICALITY AND CONTAMINATION POTENTIAL IN SETTLING TANK 241-Z-361

RL Program Manager:	D. W. Templeton	1-509-373-2966
Contractor Program Manager:	T. E. Huber	1-509-373-1503

36.1 Scope

This vulnerability is applicable to the 241-Z-361 Tank only. This tank contains approximately 80,000 liters of plutonium-bearing sludge. Assays of the tank sludge indicate that between 30 and 75 kgs of plutonium are contained in the sludge.

36.2 Remediation Objectives

Mitigation of this vulnerability will be complete when the sludge has been removed from the tank and packaged for WIPP disposal.

36.3 Remediation Process

The sludge will be removed from the tank using a method that ensures the plutonium concentrations in the sludge do not change. The sludge will be loaded into 55-gallon drums and prepared for WIPP disposal. Currently, the only preparation envisioned is to immobilize the sludge via cementation or equivalent.

After the sludge has been removed the tank will be prepared for turnover to the EM-40 program.

36.4 Schedule Objectives

Start remediation: FY 2002
Finish remediation: FY 2005

36.5 Assumptions

That the concentration of the plutonium in the sludge will allow disposal without safeguards.

That immobilization of the sludge will be sufficient to meet the WIPP/WAC.

36.6 Issues and Problems

WIPP is not operational at this time. Hanford waste storage may be insufficient to support this work if WIPP does not open as scheduled in FY 1998.

36.7 Alternatives/Impacts

TBD

36.8 Technology Development

TBD

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